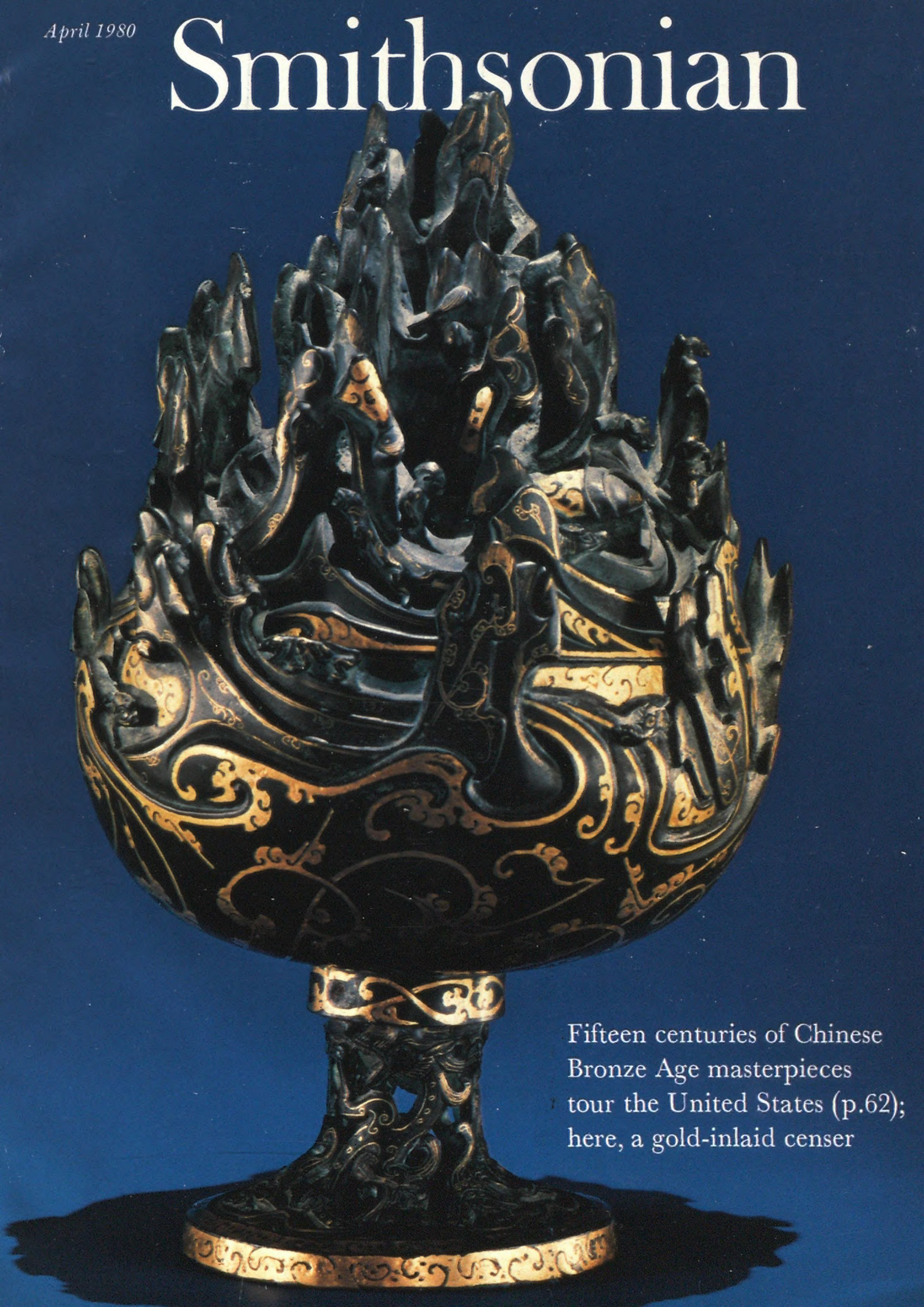
April 1980

Smithsonian



Fifteen centuries of Chinese Bronze Age masterpieces tour the United States (p.62); here, a gold-inlaid censer

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The facts are startling. Experts estimate that about half of all automobile occupant fatalities last year might have been avoided if the people had been wearing seat belts. That's because injuries occur when the car stops abruptly and the occupants are thrown against the car's interior. Belts reduce this risk.

Many people say they know the facts, but they still don't wear belts. Their reasons range all over the lot: seat belts are troublesome to put on, they are uncomfortable, or they wrinkle your clothes. Some people even think getting hurt or killed in a car accident is a question of fate; and therefore, seat belts don't matter.

If you're one of those people who don't use belts for one reason or another, please think carefully about your motivations. Are your objections to seat belts based on the facts or on rationalizations?

Here are a few of the common rationalizations. Many people say they are afraid of being trapped in a car by a seat belt. In fact, in the vast majority of cases, seat belts protect passengers from severe injuries, allowing them to escape more quickly. Another popular rationalization: you'll be saved by being thrown clear of the car. Here again, research has proved that to be untrue—you are almost always safer inside the car.

Some people use seat belts for highway driving, but rationalize it's not worth the trouble to buckle up for short trips. The numbers tell a different story: 80% of all automobile accidents causing injury or death involve cars traveling under 40 miles per hour. And three quarters of all collisions happen less than 25 miles from the driver's home.

When you're the driver, you have the psychological authority to convince all of the passengers that they should wear seat belts. It has been shown that in a car, the driver is considered to be an authority figure. A simple reminder from you may help save someone's life. And please remember children can be severely injured in automobile accidents, too. Make sure Child Restraint Systems are used for children who aren't old enough to use regular seat belts.

Because so many people still don't use their seat belts, the government has directed that some form of passive restraint—one that doesn't require any action by the occupant—be built into every car by the 1984 model year. GM is offering one such restraint—a new type of automatic belt—as an option on the 1980 Chevette to gain insight into its public acceptance.

By the 1982 model year, we must begin putting passive restraints in all full-size cars and, eventually, into the entire fleet. But until you purchase one of these cars of the future, you can protect yourself and others by using seat belts and urging your family and friends to follow your example.

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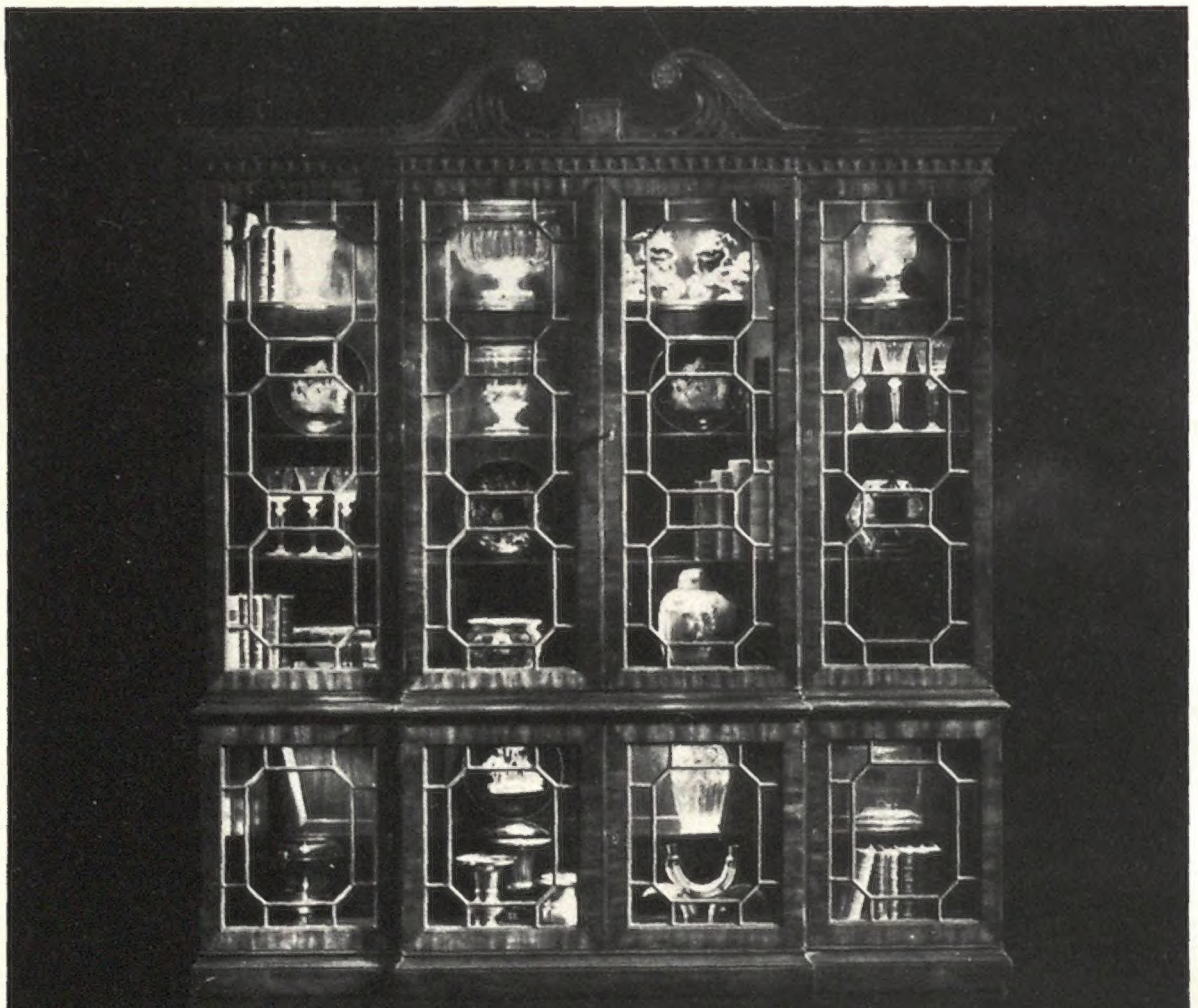

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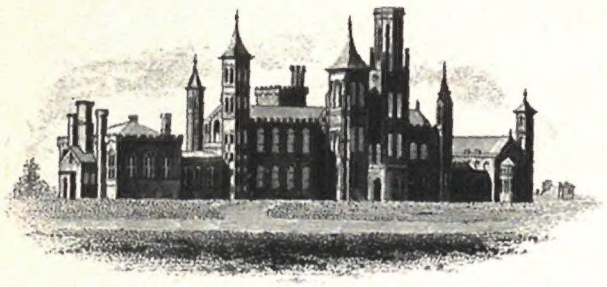
Secretary Ripley's comments

The view from the castle



With its trove of photographs and tapes and its eight million documents, the Archives of American Art is now a unique resource

What makes an artist? None of us really knows the elusive combination of inherited and learned skills, the will, the discipline and the patience which in varying proportions makes up a recognizable creator. Artists probably fail more often than they succeed. The number of recognized or successful artists must always represent a fraction of the strivers. But still we wish to know something of their history, what happened and when, who influenced whom, and all the steps along the way.

Curiously enough, little has been done in the past to document the lives of identified artists. Only by chance were diaries or sketchbooks or biographical materials kept, and not at all as a systematic thing. American art, especially, has been little known and only slightly appreciated over the three and a half centuries of its existence—and this mostly in the realm of portraiture or, beginning in the 19th century, landscapes. But what did anyone know of the lives of many American artists before Edgar P. Richardson published his monumental *Painting in America* in 1956? It was while working on this book, and finding it difficult to locate the information needed, that he began thinking about a centralized research facility for American art.

Richardson was then the director of the Detroit Institute of Arts. At the same time, Lawrence A. Fleischman—then an adventurous Detroit collector, now co-director of the Kennedy Galleries in New York—was frustrated by his inability to learn more about the works he had collected. Together, and on a shoestring, the two started the Archives of American Art in 1954.

Beginning with a survey of his native heath in Philadelphia, a cradle of the arts in America, Richardson found that museums, libraries and kindred institutions were eager to help and to provide copies of whatever historical records they possessed. With foundation aid, and with word-of-mouth help from a committee soon organized, the Archives became a notable feature of the world of art and art history as it began to burgeon in the 1960s.

In 1970 the Archives moved its headquarters to New York, where it is now under the capable direction of its longtime second director, William E. Woolfenden. In that same year, financed now by an earnest and effective group of trustees, the Archives approached the Smithsonian to take it under its wing. Highly appropriate as a Smithsonian activity, this invaluable resource was accepted by the Regents and given a permanent home for its documents within the library shared by the National Collection of Fine Arts and the National Portrait Gallery. With help from the trustees in raising funds and an annual subvention from the Institution, the Archives now has three other branches (Boston, Detroit and San Francisco) and a trove of more than eight million documents from the 18th century on, as well as photographs, clippings and taped "oral history" interviews. It has become perhaps the single most important scholarly resource for the vast explosion of interest in American art that has taken place in the last decade. The Smithsonian has been fortunate to find ready-made a mechanism for so enhancing the understanding and perceptions of American art. This is truly "increase & diffusion."

S. Dillon Ripley

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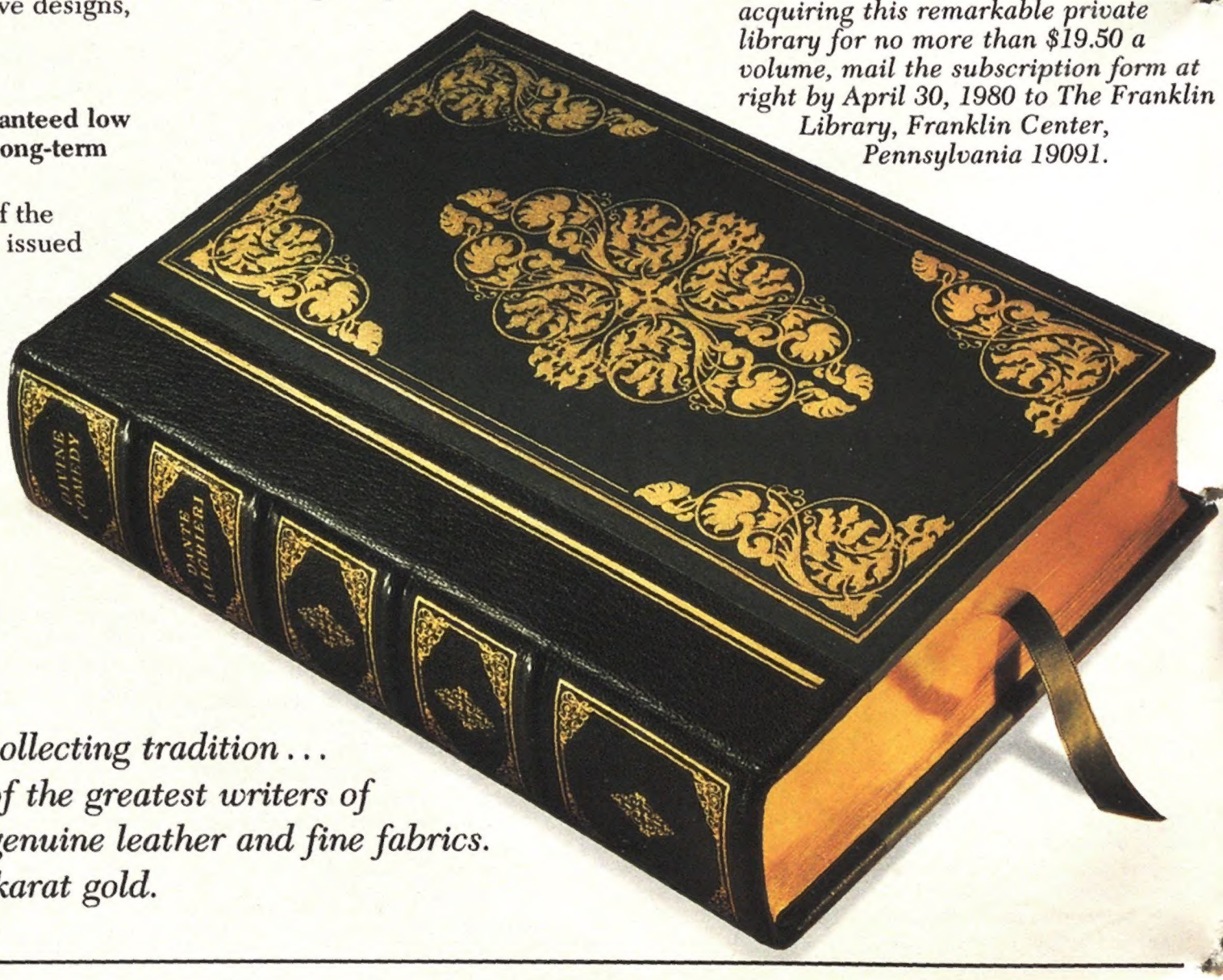

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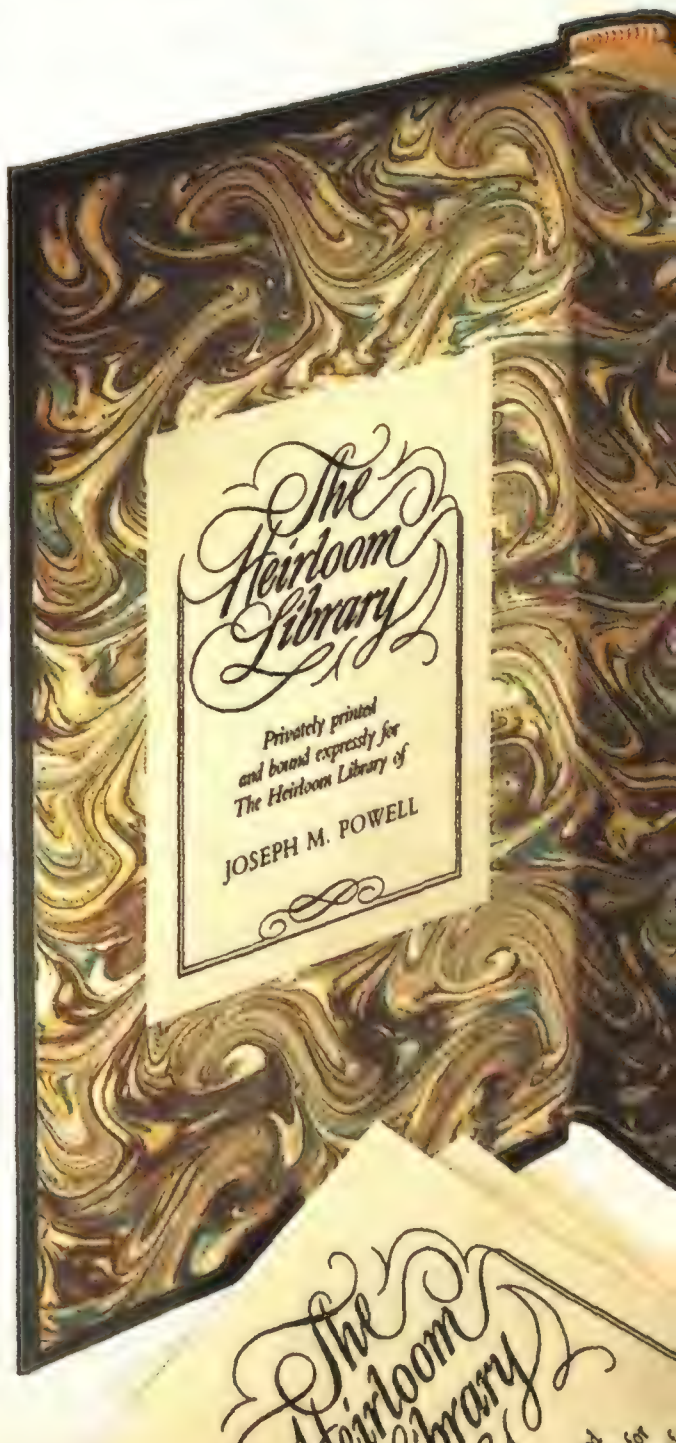
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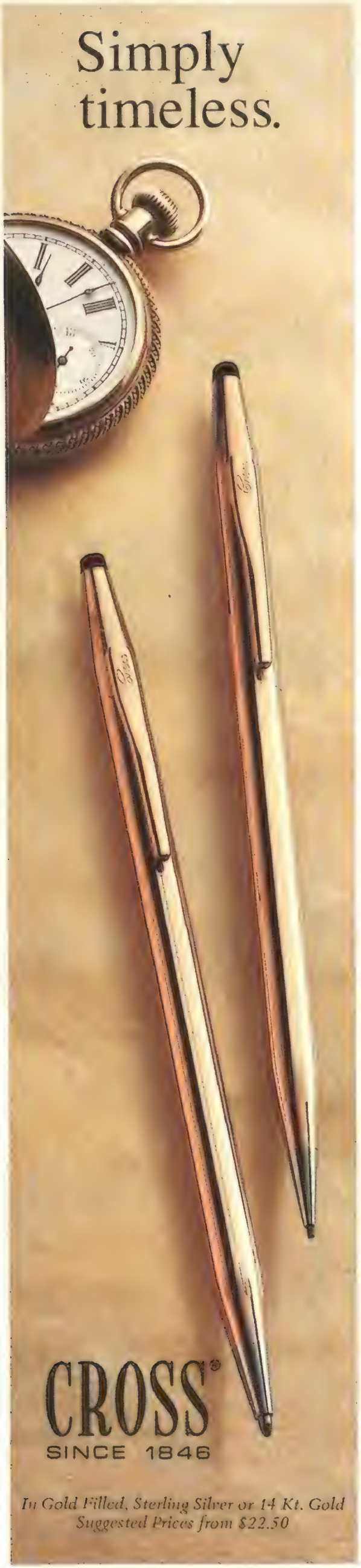

Letters to the Editor

Monet's Giverny

Dear Sir: In an era of national woes, overseas military aggression and eroding credibility, it was a treat to read the beautifully empathetic article in your February issue about artist Claude Monet's garden at Giverny.

The pictures and words are to be treasured, and the description and list of the flowers and flower beds is a compendium any landscape artist and poet would be proud of.

A toast to Mrs. Wallace and Mr. Van der Kemp for restoring old-fashioned beauty and serenity to Monet's Giverny, and to Mr. Schiff for describing it so warmly and vividly.

Katharine Wallace
Woodside, California

Dear Sir: I met Claude Monet for the first time, with Georges Truffaut, in 1923. [The writer, now 82, was an assistant at the Truffaut nursery.] Monet's strong personality and the setting out of his beautiful gardens impressed me very much, especially as I was coming back from World War I, still very young. I remember having admired with indescribable joy the floral settings created by Monet in a particularly artistic way. I still have green memories of large spreading flowers such as Michaelmas daisies, delphinium, big flowered poppies, iris, phlox, different species of sunflowers and multiple annuals. The numerous wisteria made a blue-mauve and incomparable wreath along the handrails of the bridges that spanned the ponds. In the same ponds in summer the well-known water lilies were blooming white and pink, being admired and painted so many times by the great master.

Within a short time Monet's garden will find its former beauty. His heart and soul will once again be in the midst of all those flowers he loved so much.

André Devillers
Le Chesnay, France

Draft horses

Dear Sir: As an old farmer who has been there, I have no objection to people riding around my place in cowboy suits as long as they stay on the road and keep off the crops, but I hope Peter Chew in his article on draft horses does not think we can farm profitably with the horse.

There is no question that the big draft horses are beautiful and good for short, heavy hauls, but below the Missouri-Iowa line they may not be able to stand the heat. That is why we used to work mules. And *there* was a real animal for you in spite of all the stupid, half-witted jokes about it. Mules were twice as smart as other draft animals, and they were a real hazard if they caught you out in the pasture in the open. It was not that they intended to hurt you, but they would crowd around so close to be nuzzled that there was always the danger that one of them would kick at another to keep him away and all hell would break loose.

I frankly admit to all comers that my son is a much better farmer than I ever was. Part of this, of course, is owing to the development of bigger tractors, combines, improved seed, herbicides and fertilizers, but there are other factors. Perhaps 50 percent of it is that he knows better than I how to put it all together, in spite of the tremendous risks and costs, and still make a decent living. But when I see some of his bills I can only shake my head.

T. M. Hamilton
Miami, Missouri

Dear Sir: The nicest picture I ever saw in my 80 years is the one of the beautiful gray Percheron saying good morning to his master as the day's work begins. If that isn't an expression of love, I never saw one!

I am going to frame it, show it to everyone I know and keep it where I can see it all the time.

Edna L. Macumber
Buckfield, Maine

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Dear Sir: Hooray, hooray! What a nice article on the draft horse. However, as a Clydes breeder, I have one objection. There was no close-up photograph of the Clyde. Sad! [For a pair of Mrs. Whitman's Clydesdales, see below.]

Julie C. Whitman
Oxford, Michigan

Monte Albán

Dear Sir: John E. Pfeiffer's interesting article on Monte Albán reminded me of the interpretation our Mexican guide gave us concerning the *danzantes*. It was his claim that the figures were not of slain or sacrificed captives but were of women who had given birth to notable figures, and the stelae served as announcements of the births (in one case the death of the mother, another that of the child). He was convincing, but I had not heard previously or seen references to this theory, and I wondered if it has been considered by archaeologists, or was it the complete fantasy of the guide?

Willis N. Moore
Polk, Ohio

Tour guides, not being professional archaeologists, often convey misinformation by repeating speculation and folklore. There is no archaeological evidence to support the theory that the figures are women, and a great deal of evidence to

KINGSLEY AMIS on The Folio Society

Before I went into the matter I was suspicious of The Folio Society. I imagined that it dealt in needlessly expensive, needlessly luxurious volumes of the sort meant to grace the drawing-room rather than to be read, and that the actual texts would be either over-familiar or boringly recondite. Well, excellent though unfussy standards of production are indeed maintained, something rare and attractive in itself to those who want a change from disintegrating paperbacks and hardbacks blurrily printed on see-through paper. But prices are actually low, considering; if you think a distinctively-bound gathering of forty-seven stories by Saki, with a full, lively introduction and ten full-page Osbert Lancaster drawings, is dear at $13·75, I can only say I don't.

The selection, again, does cast its net wide within reason. No intelligent, educated reader could have much trouble coping with membership requirements and picking four books a year out of the fourteen the Society publishes (another comes free) and the backlist now growing above a hundred. I will use the rest of my space glancing at a few of the titles, with the prefatory remark that there are several here I was very struck by but would probably never have come across otherwise. Joining The Folio Society is a great boost to the interested but unexplorative reader.

The section of the list I will call non-fiction gave me most of my surprises. Bernal Diaz was a soldier with Cortes' expedition to Mexico; he saw it all, remembered it in astounding detail, and dictated the story to his children at the age of 84, when almost blind. J. M. Cohen made what is evidently the first modern translation – title, *The Conquest of New Spain* – not generally available before. In *The Mutiny and Piratical Seizure of H.M.S. Bounty*, by Sir John Barrow (Navy Secretary in the 1800s), the accounts of Bligh's immense open-boat voyage and of the disaster-racked pursuit of the mutineers fascinated me even more than the mutiny itself. *The Narrative of the Voyage of H.M.S. Beagle* (compiled from contemporary sources and illustrations) is a very different but no less extraordinary sea-story.

Also (shamefully) new to me was James Hogg's novel of 1824, *Confessions of a Justified Sinner*, a frightening tale of religious mania and the Devil in the same league as *Dr Jekyll and Mr Hyde*. *Twenty-one Tales* by Rudyard Kipling, specially selected, is an excellent introduction to our greatest short-story writer. I would pick the Society's edition of *Gulliver's Travels*, with marvellous, appropriately strange lithographs by Edward Bawden, as far the best available. That monument of the 1930s, Christopher Isherwood's *Goodbye to Berlin*, is advantageously furnished with contemporary drawings by George Grosz. *Ghost Stories of M. R. James*, another admirable selection, takes you into a world where 'you will meet with persons walking who should not be walking. They should be resting, not walking.'

The whole list shows professional skill and care at all points. Each book is well chosen and well designed; the editing and the introduction, if any, have been entrusted to the right person; the illustrations, whether of the period or original, are relevant, suitable and often pleasing in themselves. I hope The Folio Society continues to prosper. It deserves to.

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support the theory that they are slain captives. Ed.

Narwhals

Dear Sir: In Noel D. Vietmeyer's article, "Rare narwhals inspired the myth of the unicorn," Catherine de Médicis was mistakenly referred to as the wife of Francis I. She was his daughter-in-law, married to his son, the Duke of Orléans, later Henry II.

Fran R. Creevey
Los Angeles

The Adirondacks

Dear Sir: Jane Eblen Keller's article on the future of the Adirondacks was of particular interest to me as a native of upstate New York and as an avid fly-fisherman, but I mentally tripped over the unfortunate description of Richard Beamish's place as being on a small lake "as clear as rainwater."

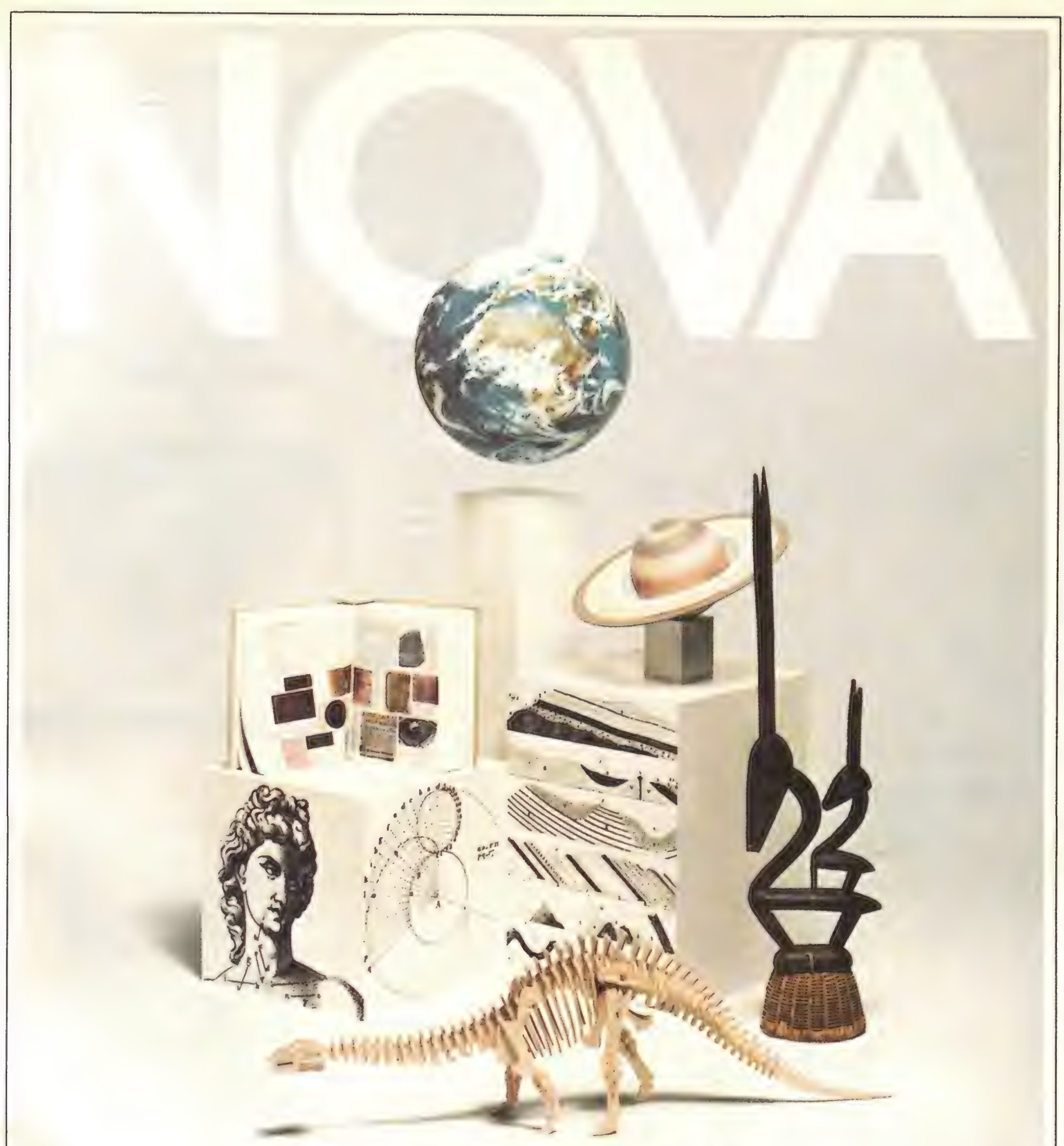
Rainwater—particularly in the Adirondacks—is not at all "clear." Indeed, it is better known as "acid rain," and it represents a formidable threat to the environment and to the ecological stability of the entire region.

Many remote Adirondack lakes have already been rendered fishless as a result of acid rain, and the Canadian government estimates that acid rain may kill fish in 48,000 lakes in Canada within the next 20 years.

Roy R. Russo
Washington, D.C.

Dear Sir: I read with considerable interest your article on the Olympics and the Adirondack Park.

Richard Beamish (who ironically was communications director of the Adirondack Park Agency at the time the construction of the federal prison at Ray Brook was proposed as a means to house the Olympic athletes) may see the agency's "low profile" regarding the prison as a sign of weakness. As a matter of fact, the agency could not exercise project review authority over the prison because as a federal project it was not subject to the jurisdiction of APA law. Nevertheless, the agency provided a review of the proposed project plans to federal and Olympic officials, pointing out the potential for the soil erosion and the environmental dam-



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age that did, in fact, occur. Unfortunately, our recommendations for mitigating measures were ignored.

Among the changes taking place recently is the promising new relationship with the people and the local governments of the Adirondacks owing to the agency's improved communications program and new attitude. We now emphasize that the agency and staff have an obligation to be courteous and helpful to local residents and sensitive to their community needs.

As a result, we no longer have "horror stories," and the bumper stickers calling for the abolishment of the agency are disappearing. While the concept of regional land-use regulation in the Adirondacks undoubtedly will never have total acceptance, it is clear that the agency's goals and objectives are now viewed as positive by a large number of Adirondackers and that the agency's current processes are broadly considered to be more open, efficient and reasonable.

Theodore M. Ruzow, Chairman
New York State Adirondack Park Agency
Ray Brook, New York

Dear Sir: Anyone who thinks it can't happen to the Adirondacks ought to take a complete tour of Pennsylvania's Pocono Mountains. Every place of natural interest seems to have been taken over by venal entrepreneurs. Roads leading to the Pocono region are lined with huge billboards urging one to come here, go there, see this, do that, and there seem to be more resorts, golf courses, honeymoon havens, swimming pools, ski resorts, amusement parks and souvenir stands than in any comparable part of the United States.

Doug Whiteside
Belvidere, New Jersey

Dear Sir: Humans do not *need* to despoil, inhabit, or even benignly visit every inch of Earth. It should be acceptable for an area (a forest, swamp, lake, mountain) to exist without humans merely because it has an equal right to existence on this planet. With our intelligence and foresight, it is up to us to provide for the survival of all life; to protect the Earth so that it can continue as a life-supporting environment.

Vicki C. Hayes
Washington, D.C.

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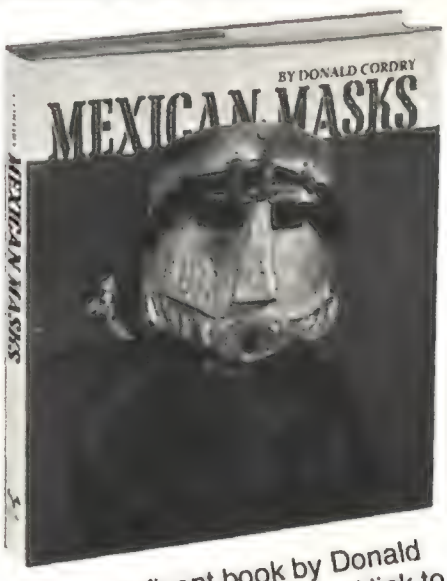

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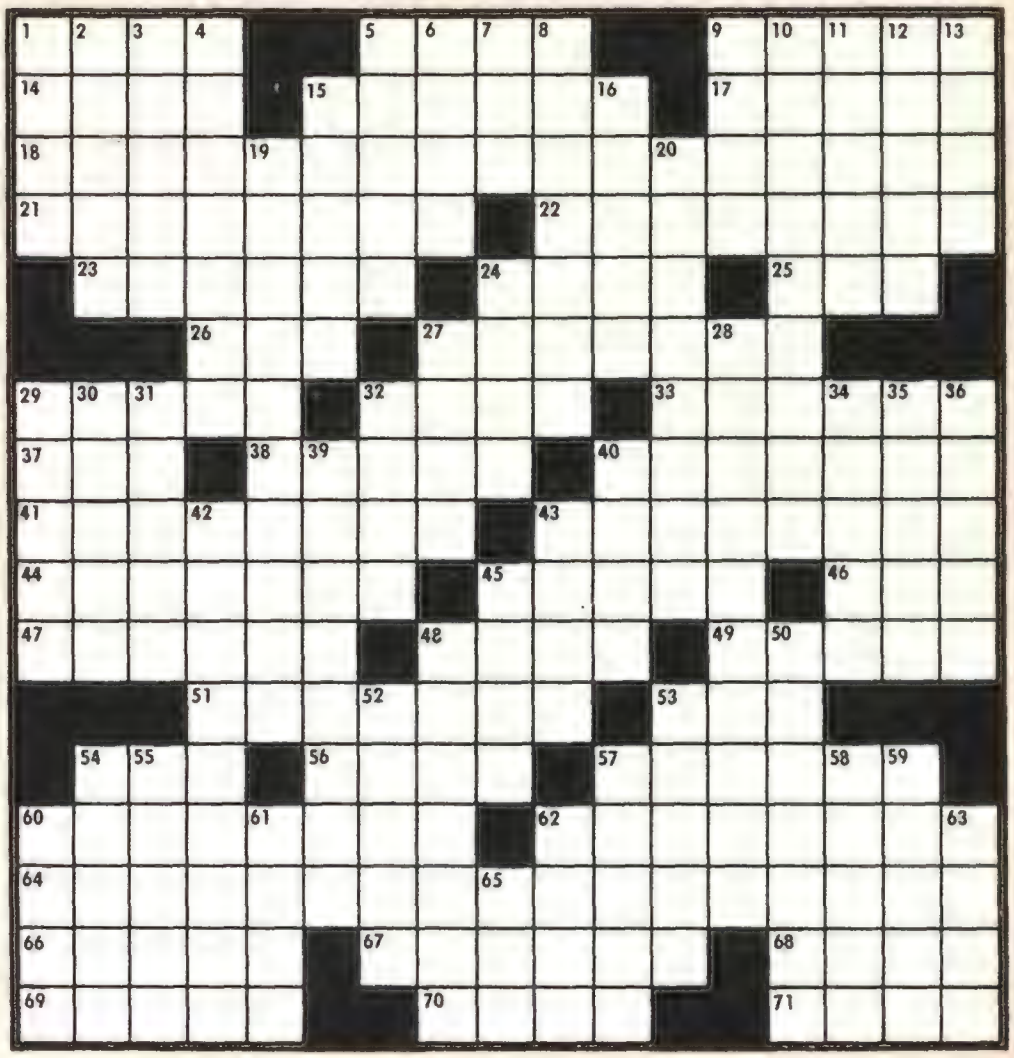

ACROSS

1 Carpenter's file
5 Game with 32 cards
9 Plowed land
14 Nanking nana
15 Audient
17 Noted Finnish philosopher: 1835-1924
18 Start of a poem by Burns
21 Too young to be served liquor
22 "--- tavern..."
23 Rubbernecking
24 Make sound
25 Q-U connection
26 "--- for the road"
27 Composer of "The Red Mill"
29 Middle East weight unit
32 Walleyed pike
33 Matador's lure
37 Raggedy doll
38 Philippine trees: Var.
40 Round Table town
41 China
43 Equipment for Mr. America
44 He has no deity or piety
45 Japanese lyric
46 Seine sight
47 Yucatecs
48 Undiluted
49 "And every --- queen": Kingsley
51 Goes
53 What an R.N. gives
54 Watering place
56 Birds called wahoos
57 Secular
60 Part of an atom
62 Painted the town red
64 Dos Passos novel
66 Famed Austrian contralto: 1803-77
67 Eiffel Tower levels
68 Douglas Hyde was its first president
69 German sculptor-painter: 1440-1533
70 Argus multiple features
71 Ocular ailment

DOWN

1 Stew, in Siena
2 Mohammed's mother
3 White --- National Monument, N.M.
4 One that may set the world on fire
5 Flock of herons
6 Danny, Sammy or Stubby
7 Estuary
8 Reeling
9 "Kilt him --- when he was three"
10 Church of Scotland clergyman: 1804-68
11 He spawned Hitler
12 "When thou --- this terrible thing": Isa.64.3
13 Author Seton
15 Viscount Templewood
16 Therapy center, to a G.I.
19 Battle site: Sept. 11, 1777
20 Skier's turn
24 Linen marking
27 Darner's target
28 Uproar; fracas
29 Palindromic title
30 Loos or Louise
31 Not bashful
32 Gossip's interest
34 --- Bell (Emily Bronte)
35 End of a Hemingway title
36 Flummoxed
39 Foreign visitor's need
40 Item to go with ale
42 Vexatious situations
43 Man from 40 Across
45 Shebangs
48 Turn the palm downward or backward
50 Impeaches
52 Make --- of (record)
53 Gogol's "--- Bulba"
54 Distort a report
55 Hungarian coin: 1925-46
57 Roman tutelary gods
58 --- as a fiddle
59 Suspicious
60 Australian avifauna
61 Grog quaffers
62 Drayman's charge: Abbr.
63 Scotch for grief
65 Aye neutralizer

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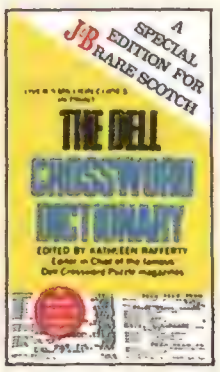

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Phenomena, comment and notes

The Stop Continental Drift Society, a close encounter with an asteroid and good-bye to stratospheric ozone

There seems to be a general feeling that the United States flutters around reacting to one environmental crisis after another, rather than eliminating problems before they become crises. Judging from the recent scientific literature, it seems an unfair aspersion.

For example, a few years ago two scientists at the University of California warned about chlorofluorocarbons—as in the Freon in spray cans—and the potentially dangerous effects they have. Rising to the stratosphere, chlorofluorocarbons break down chemically and recombine to reduce the ozone shield between us and the sun's ultraviolet radiation. There was the predictable outcry from the spray-can industry, which, in defending its own interests, learned to share the feeling held in many quarters that environmentalists are nothing more than doomsday prophets.

But there has, nonetheless, been a general trend in the United States away from the use of these chemicals, thanks to controls—that awful word. The problem remains, however. Indeed, it appears to be twice as bad as we thought.

The National Academy of Sciences (NAS) released a report not long ago warning that if production of chlorofluorocarbons continues globally at the 1977 rate, it will lead to the loss of 16.5 percent of the stratospheric ozone by late in the next century. Just what effects we and other living things can expect from frying

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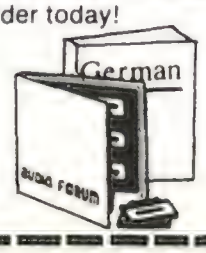

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in an unaccustomed beam of ultraviolet will be a subject of continuing controversy, but we can—in this instance—point the finger elsewhere and hope.

A big-league project

The Soviet Union is up to something in the north that could make more mischief in the long run than their southern incursion of recent months. The traditional grain-producing areas in the USSR, such as the Ukraine, have been letting the folks down in recent times. So the Soviets have been bringing new, less arable land under cultivation—such as Kazakhstan and Central Asia. The plan—to triple grain production—means massive irrigation projects. As a result, the Aral Sea has already fallen by maybe three meters—double what was originally thought—and may disappear altogether at the projected rate of use of the rivers that drain into it. What to do?

Writing in *New Scientist* (Vol. 84, No. 1184), Dr. John Gribbin says, "To the Soviet planners, big problems require big solutions. . . ." The plan in Central Asia is to divert to the south the waters of the Ob' and Yenisei rivers that now run north into the Kara Sea. An engineer's plum, but for the climatologist, a prune.

The Ob' and the Yenisei are among the world's largest rivers and they contribute a vast portion of the fresh water that flows into the Arctic Ocean. The fresh water lies on top, holding the denser and warmer saline water down below. If the freshwater barrier disappeared, the warmer salt water would melt the Arctic ice and the north could warm up. The climatologists fear that withholding the planned five percent of these two rivers' water from the Arctic could lead in the next century to a warmer Arctic. It's pleasant to speculate on hotter times for us folks in the northern hemisphere—a climate change that could maybe make the summer resort business in Siberia and Greenland pretty lucrative, but wreak havoc elsewhere. Ironically, Gribbin points out, there is a possible feedback system at work: on a short-term basis, if the flow of the Ob' and Yenisei goes down, a complicated chain of climatic effects may lead to less precipitation in the very areas the Soviets hope to irrigate.

Now there's a crisis on the drawing board, but it's hard to see what the U.S. government can do to prevent it.

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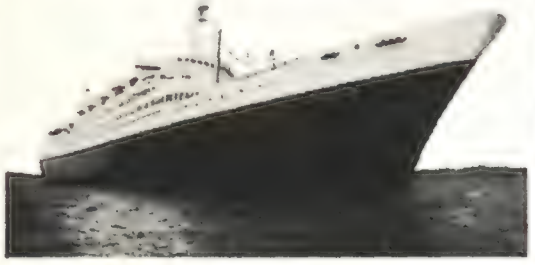

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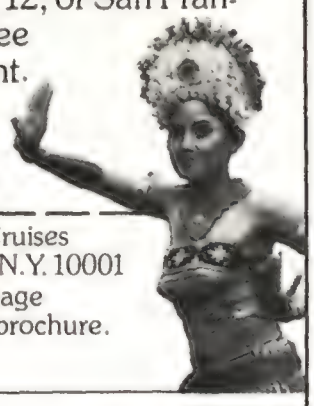

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Catastrophe theory

Indeed, there is a growing amount of thought that catastrophe and crisis are the natural scheme of things, that the Earth and its evolutionary history are the creatures, and the continuing victims, of catastrophes over which no one could exercise the slightest control.

A newspaper report recently told of still another theory about what caused the mass extinction in which the dinosaurs, along with many other forms of life, bit the dust. And dust it was.

The story goes that an asteroid the size of Pittsburgh hit the Earth with such force that it threw dust into the atmosphere in sufficient quantities to cut off the sun's light for as long as *five years*. This would be very discouraging to many forms of life.

But why, one asks—seeking more than a random, isolated event—did we suddenly get popped by a giant asteroid?

In galactic terms it happens all the time, suggest W. M. Napier and S. V. M. Clube of Edinburgh in *Nature* (Vol. 282, No. 5738). Terrestrial catastrophes are "stochastic," a heavyweight term designed to scare away anyone who wants to argue and which means expectable within the realm of probability. And the reason is, they say, that the solar system is proceeding through the galaxy, passing in and out of its spiral arms. The arms are full of junk (such as comets) which gets attracted to the sun. The planets sometimes get in the way. Matching the ages of big craters to the geological periods, the researchers get relatively precise correlations, and, they say, these wholly unprovoked attacks would also explain certain wobbles and droops that mar the solar system's otherwise stately minuet.

We have apparently just again, in galactic terms, emerged from one of the galaxy's arms, this one having given us the late, lamented ice ages. If we can persuade the Soviet engineers and other like-minded types that small is beautiful, we might have at least a few thousand years free of major catastrophe.

Special interests

The Arctic catastrophe will occur anyway, most likely: as the continents drift, the nearly landlocked ocean will find larger channels to lose cold water to more southern waters and all hell will gradu-

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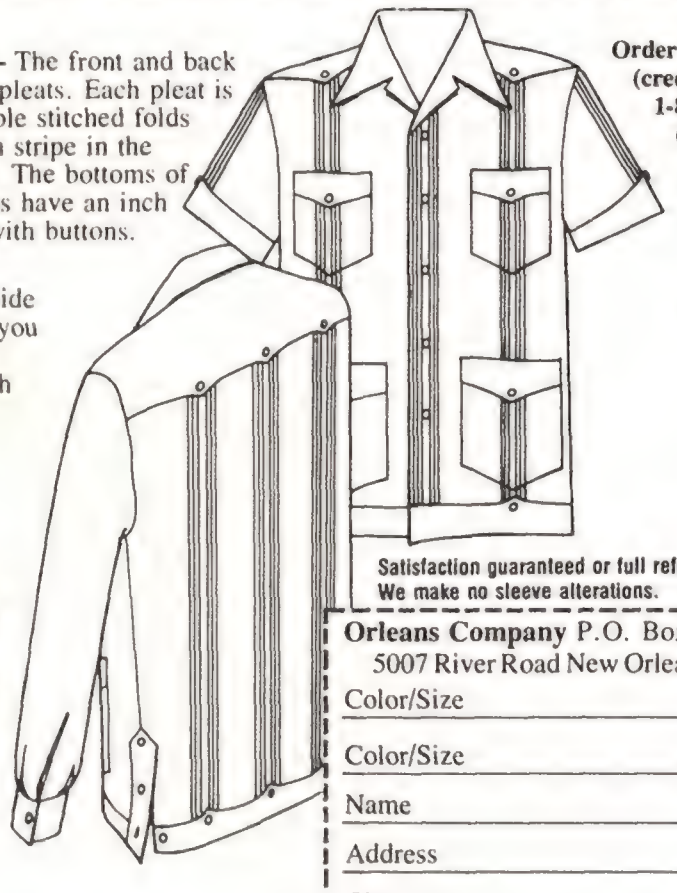

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A child reaches out to feed Victor, a legendary giraffe now immortalized.

ally break loose. Given the rate of continental drift, which makes a sloth look like a track hero, you would assume that no one would be particularly concerned at this point. But someone is. This is the age of special interests, and John C. Holden of the state of Washington finds continental drift deplorable. He is the president of the International Stop Continental Drift Society. Members may buy an appropriate bumper sticker and giggle at a newsletter that arrives with the periodicity of seismic events. It is not clear how successful the society's efforts have been to date, but presumably careful measurements are being made.

Another such group I have heard rumors of is the Procrastinators' Club, which was formed long ago but hasn't elected its 1957 officers yet. Still another mysterious group is the Buzzard Council of America, which lists its place of founding as Scavenger, Iowa (not in my atlas). Its purpose is unclear.

Perhaps the gentlest such organization —in this age of fist waving—is the Society of Victor Invictus. It was founded to commemorate an East African giraffe named Victor (above) who, to quote the society, "distinguished by age, experience, and virility—lost his footing and spread-eagled himself while attempting to be of service to Arabesque, one of his three female giraffe friends at the Marwell Park Zoo" in England. Various attempts were made to get him up, including the use of a crane and sling.

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In the morning, you'll take the short flight to Queenstown. You could spend endless days here sightseeing, shopping and relaxing; everywhere you turn there's activity. Spend the morning on the Shotover River panning

Run the rapids. Talk to a penguin.

for gold. After a picnic lunch on the shores of Lake Wakatipu, you are ready to board the jet boat that will sweep you up the Kawarau River where your raft ride begins.

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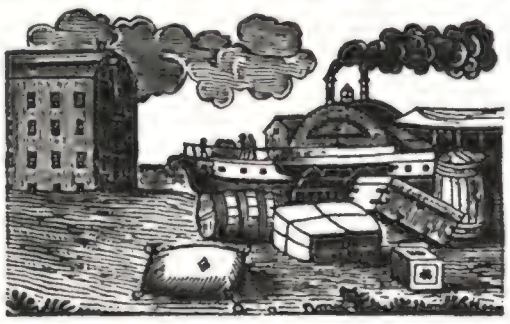

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Around the Mall and beyond

I have mentioned the treasures that sometimes come to light when a Smithsonian museum is refurbishing and airing things out in order to get ready for another exhibit. Museums are, after all, only expressions of human mores. My father's friend Slocum, back in southern New Hampshire, was once offered a cleaning woman by well-intentioned neighbors who had at last become outraged by the detritus on the exterior of his choicely situated 1790 house. So much outer crud, they decided, could only bespeak an unthinkable amount of inner crud.

Slocum listened to their proposal—a local girl to trudge up the hill and clean his house every two weeks at no cost to him—then grudgingly agreed, but "damned ef she's to *tech* anything!"

Museums are like that: go ahead and clean up, but don't mess with anything. And finally, when the very curators are smothering in their own dust, there is a convulsive, spontaneous cleanup and a number of things that have lain fallow in the growing humus are suddenly exposed.

The latest discovery at the Museum of Natural History is a bundle of letters to our second Secretary, Spencer F. Baird, from a number of Canadians of the Hudson's Bay Company. The mail dates between 1860 and 1870 and consists of messages from the north requesting various supplies and reporting certain facts. Secretary Baird's responses (which have been in the Smithsonian Archives for years) fulfill the requests and generally try to boost morale.

The key to this unlikely correspondence between the Institution and a commercial fur company lies in the theatrical young man whose photograph appears

Jo Ann Howard moved on from steno and typing to leasing oil lands over half of Texas.

As a legal secretary for Gulf at Midland, Texas, Jo Ann Howard learned a lot about the legal and personal problems connected with leasing farm- and ranchlands for oil prospecting. But all her experience was vicarious.

Boots and stogies

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"I want to be a land agent," Jo Ann said.

"It's tough work," they warned her. "And besides, land agents are all men."

"A minor problem," Jo Ann said.

Legal and human

Jo Ann knew the work. She was enthusiastic. "Okay," they said, "you're a land agent."

Jo Ann's "territory" is almost anywhere within a thousand miles of Midland.

Jo Ann's "territory" is almost anywhere within a thousand miles of Midland. It's tough work indeed. But she loves it. Especially the double challenge of handling the legal and the human side of each problem.

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Gulf people: energy for tomorrow.

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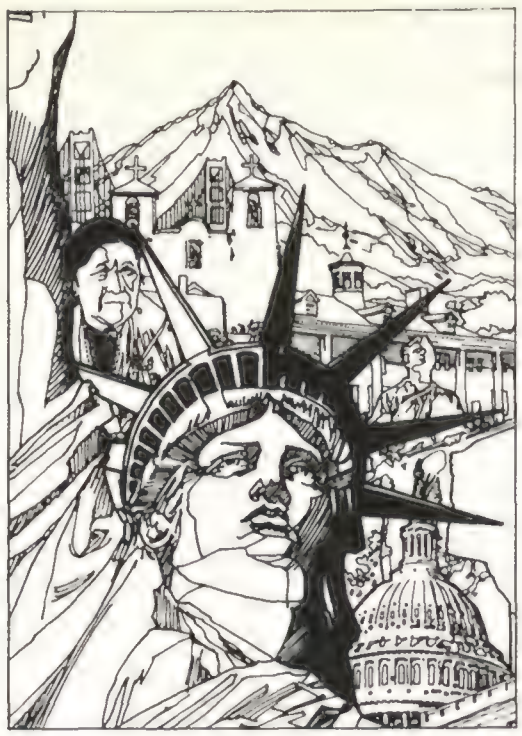

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here. Robert Kennicott, an enthusiastic naturalist with a built-in magnet to tug him toward adventure, went to the Hudson Bay country with the blessing of his friend and mentor, Dr. Baird, to see what he could find that would be of interest to the National Museum.

Kennicott found plenty, but, more important, he seems to have charmed a great many of the Hudson's Bay Company personnel into helping him—and finally into becoming full-fledged Smithsonian collectors themselves. The letters from Baird served to acknowledge Kennicott's recruitment and to see to the comfort and well-being of the recruits.

Kennicott, collector for Institution.

Secretary Baird was engrossed in building the Smithsonian collections, but he found it more useful to do so from his office in the castle than in the field. In his vast correspondence he managed his field people, cosseting them, encouraging them, thanking them. He sent them supplies—guns and ammunition, trading goods for use with Indians, tobacco, needles, specimen requirements.

So here are some 600 letters and other papers that reflect this concern. It is interesting to see the names of the Hudson's Bay people. Scots have traditionally been among the foremost British travelers and adventurers and colonists. And here they are, a meeting of the clans, in the company: McDonald, McDougall, McKenzie, Reid, Campbell, McLean, McTavish and the two foremost collectors and correspondents, Roderick Ross MacFarlane and Bernard Rogan Ross.

Ross was chief trader for the company;

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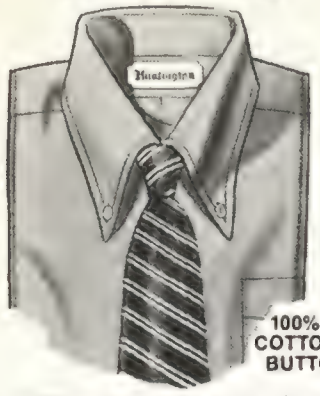

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MacFarlane was in charge of several fur-trading posts and was, I suppose inevitably, interested in natural history. He was a patsy for the Kennicott charm. All the others were, too, to some extent. The young man persuaded them to gather flora and fauna for that distant Institution down in Washington.

In 1865 Robert Kennicott was put in charge of a collecting group, partly sponsored by the Institution, which was to accompany the Western Union Telegraph Expedition in Alaska. This project was supposed to figure out how a telegraph cable could be brought up into Alaska, laid across Bering Strait to Siberia and thus link our continent with Eurasia. It came to an end in a couple of years because the bugs were finally worked out of the Atlantic cable, which achieved the same end.

Kennicott, tragically, died during the expedition. In the expression of those days, he died of a broken heart. More specifically, he was constantly trying to keep the peace among the scientists who were apparently given to fierce infighting over their pecking order. William H. Dall, who took over from Kennicott, reported that he "was badgered to death." Apparently office politics was even worse in the wilderness.

The file of Canadian letters, now in the hands of William Deiss of the Smithsonian Archives, was discovered on top of a dusty filing cabinet by Frank Greenwell of the Museum of Natural History. He was looking for something else, and there they were.

The letters had apparently been pulled out some years ago and then never replaced. Anyone who fools around with files recognizes the circumstances: you want something under "B" so you pull "A" in order to get at it, and after you're done you forget to put "A" back. Some 40 years later, when everyone wants to know about Afghanistan, no one can find "A" because it's buried in dust atop the filing cabinet. My own office is so crammed with examples that I can barely get into it.

The Mall will be crammed with Belgians this month because they are marking their 150th birthday as an independent nation, and we in the United States are helping them. Among the visitors will be the King and Queen.

The Belgian conquest of the Mall will

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Congress' watchdog, the General Accounting Office, said in a blistering July 1979 report: "Excessive truck weight is a major cause of highway damage. The rate of highway deterioration will slow down if excessively heavy trucks are kept off the highways...A five-axle tractor-trailer loaded to the current 80,000 pound federal weight limit...has the same impact on an interstate highway as at least 9,600 automobiles."

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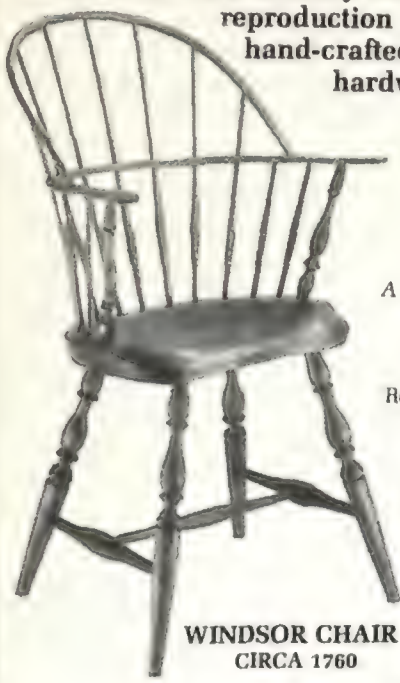

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be a media event, all right, and you can read the names and numbers of all the players in the "Highlights" section on p. 162. The Smithsonian plays a major role in the celebrations, what with art at the Hirshhorn, marionettes—up to three-and-a-half-feet tall—at the Renwick, theater at the Baird Auditorium, music, lectures, workshops and films. But the thing I think of, with slavering jowls, is food.

Belgium's royal couple come to the Mall.

In preparing *Belgium Today,* the program of events that we will see here in Washington and also in New York and San Francisco, the Belgians invited members of the media to receptions for proper briefings. Through a no-doubt embarrassing clerical error I was invited (with a pretty darn thick card) to show up at the Embassy one noon. Hoping that the mistake wouldn't be discovered, I hurried over and found myself pampered and caressed by a lot of terribly nice people with Continental accents and extraordinary taste in food.

There was rare roast beef, not just sliced up so you could slap it on a chunk of bread, but neatly cut into matching rectangles, the fatty parts dismissed, the reddest and juiciest slabs gathered in a circle around a marvelous and mysterious nucleus. There was pâté so tastefully presented that you hesitated to ravage the effect. There were innumerable cheeses, all resting on crisp lettuce, daring you to stab away at them. There were dainty, glazed pastries. There were decanters, ruby red with Burgundy from Burgundy, pale gold with hock from the Rhine.

Simply to pass that buffet brought tears to the eyes. How a nation that can

fast-food

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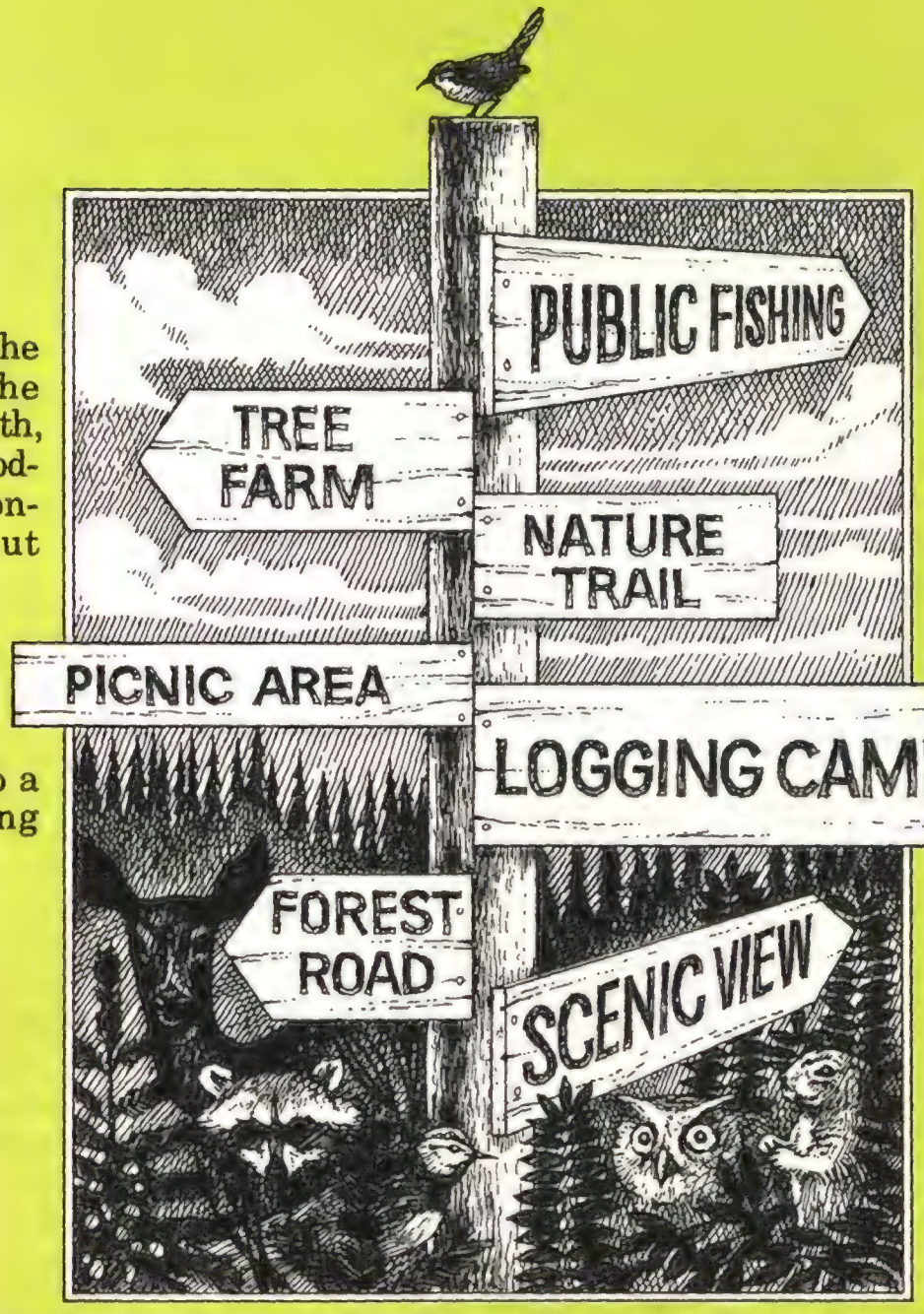

The forest is one of the most useful resources the planet has been blessed with, providing thousands of products that are not only convenient and pleasant but essential: lumber and building materials, paper products, packaging, chemicals, fuel.

But the surprising, bountiful forest is also a source of other enduring benefits:

Fishing streams, for example.

Nature trails.

Swimming holes.

A place for Sunday drives.

Grazing land.

Board and room for wildlife.

Pure water.

And escape.

Sharing the benefits

All these can and do coexist in the working commercial forests of America. (*Commercial forest,* as defined by the U.S. Forest Service, is *all* forestland — whether owned by individuals, government or the forest industry — that is capable of, and potentially available for, growing repeated crops of trees for harvest. It includes land in National Forests but not in National Parks or Wilderness areas.)

But demands on the commercial forest are growing at an alarming rate. An expanding population is placing new pressures on the forest for recreation. Thousands of acres are withdrawn every year for homes, shopping centers and additions to Wilderness. And of even more concern, America's consumption of wood and paper products is expected to double in the next 50 years.

Can the commercial forest keep on providing these multiple benefits indefinitely?

The big if

There is reason for cautious optimism *if* the techniques used by industry to grow more trees, faster, can be applied on *all* our commercial forestland.

Unfortunately, trees are not growing fast enough in all commercial forests. Productivity is less on privately owned land than on industry's and is seriously lagging in National Forests.

So there is a long road ahead if America is to continue to receive multiple benefits from the forest.

If you'd like to be better informed on how important it is to keep America's forests productive, write American Forest Institute, P.O. Box 873, Springfield, VA 22150 for a free booklet, "The Great American Forest."

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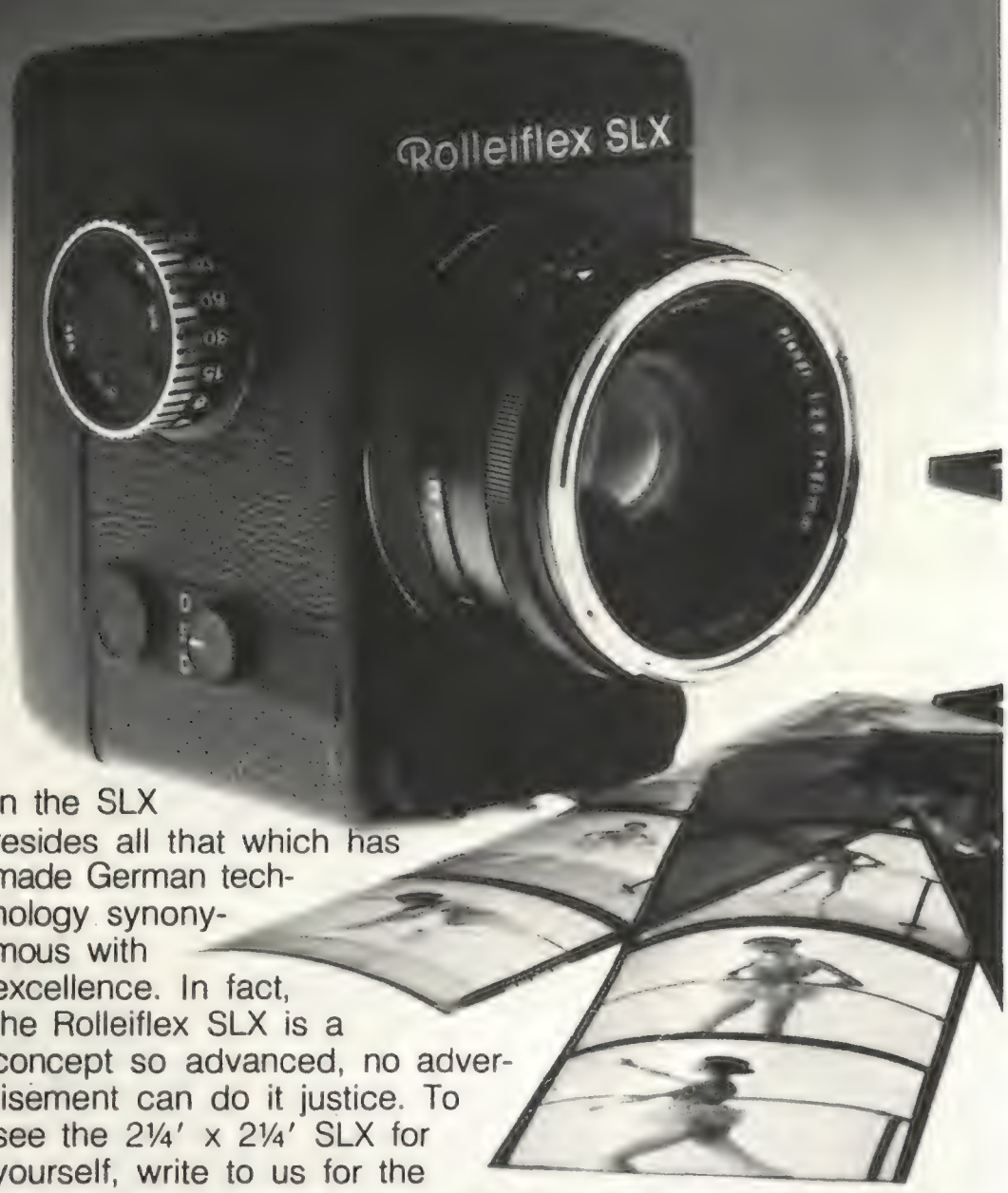

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Rollei

Owning a Rollei says something about you.

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handle food like that has survived 150 years is more than I know, for this smacks of self-indulgence on a Roman scale. Surely the Goths must be on the way.

I am conquered. I shall wander around the Mall during all the regal festivities. In memory I shall be tasting a little of this, sipping a little of that. I shall clap my greasy hands for the royal couple and cheer fatly for good old Belgium.

One of the *Belgium Today* events that I intend to see, even though no seductive buffet adjoins it, is a performance at the Baird Auditorium, scheduled for April 22, called "Two by Two by Belgium." It's to be presented by two children's theater groups. One is the Flemish Children's Theatre of Ghent; the host group is the First All Children's Theatre which calls New York its home, but which travels, thank God, to play for us in the provinces.

First ACT, as it quite cleverly calls itself, received rave reviews during the latter part of the Seventies, when it hit its stride. Its kids, six to 17, working under the direction of Meridee Stein—who helped me destroy some of that Belgian pâté—get across a sense of elation which is all too rare these days.

In the joint performance, the Belgians and First ACT each get 45 minutes. The Belgians perform in Flemish, French and English. The Americans perform in American. It'll be good.

The Smithsonian Institution's *Guide for Disabled People* has been published and is out there to help the handicapped not only to get around our museums safely, but to love every minute spent in them. For those with limited mobility, there are the necessary ramps and rest-room equipment and other things they may need. For the blind there is Braille, also recorded guides to listen to. And so on. We have spent a good while getting all this set up, and we're proud of the results. At the opening of the program, in February, Harold Russell helped in the receiving line. He played the amputee in *The Best Years of Our Lives* if your memories go back as far as that—a wonderfully emotional bit in a very good movie.

The Smithsonian guide is pretty complete—enough so to use for planning your sightseeing day—and can be picked up at our museum information desks. There's a limited edition in Braille.

—Edwards Park

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A new advance in family 4-wheelers.

Exciting news for 1980: Bronco introduces Twin-Traction Beam, the only truck in its class with independent front suspension. Feel the difference on the road. And off.

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Roomy interior has all-new styling, options like tilt steering wheel, reclining Captain's Chairs up front, AM/FM stereo with cassette or 8-track tape player.

New Bronco choices include six roof colors. Above: Landau Tu-Tone with accent tape stripe. At top: Free Wheeling Bronco shown with optional tri-color tape stripe, styled steel wheels, RWL tires, and more.

Independent front suspension eases wheels over bumps separately to give a better ride than last year. Helps off-road control.

FORD

FORD DIVISION Ford

By Richard L. Williams

The Library of Congress can't hold all Man's knowledge—but it tries

Even with a brand-new $160-million annex, this Brobdingnagian repository is hard pressed to handle all its varied assignments

Massive James Madison Memorial Building is at right of main Library, which obscures Jefferson annex.

Architecturally it is a monster, called by some a monstrosity, "the box the Sam Rayburn Building came in," but the Library of Congress, desperate for space, will be glad to get it. On the 24th of this month, in a 180th-birthday gesture, Daniel Joseph Boorstin, the institution's 12th Librarian, will cut a ribbon and accept from the Architect of the Capitol—who may be equally glad to be rid of years-long responsibility for it—the James Madison Memorial Building, one of the largest and, at $160 million equipped, the most expensive structures ever put up in Washington, D.C.

It stands across Independence Avenue from the magnificent 83-year-old Italian Renaissance main edifice of the Library, and catercorner from the Thomas Jefferson "annex," half that age and twice as utilitarian. It is also across a Capitol Hill street from the Cannon Building, which houses Congressmen who long cast covetous eyes at it and only four years ago came close to snatching it for their own expansion.

The capital already has monuments or memorial shrines to Washington, Jefferson and Lincoln; the new building will contain the first memorial to James Madison who, in 1783, long before becoming the fourth President, proposed a collection of books for a "library of Congress." His memorial will be a two-story hall off the main entrance, with some of his words carved in wooden walls flanking his statue.

The building named for him will dwarf his hall. Its nine floors have more space than 35 football fields and double the space of the two older buildings. When fully occupied a year from now, it will house four-fifths of the 5,700-person staff and two-thirds of the 18-million-book collections. The Copyright Office will move back from two big office buildings in Crystal City across the Potomac River in Virginia. The Geography and Map Division, with its priceless treasure of 3.5 million maps, will come back from the boondocks of farthest Alexandria, where it had to be moved for space 11 years ago but where the call on the division's services dropped 40 percent.

Still, it will not be big enough. In 1897 the then-new Library was reckoned ample to hold all Man's knowledge, from everywhere on Earth, under one roof. In 1938 the Annex came along and by the same reckoning, under *two* roofs, surely . . . but what nobody reckoned with was the information explosion. When this third gigantic storehouse was planned two decades back, the assumption was that it would do until the 21st century. Yet the assumption is long since out of date for a multimedia complex that keeps adding two volumes to its hoard every second. Evidently some things do not change: 22 years ago L. Quincy Mumford, then the Librarian, complained to Congress that "we are literally bursting at the seams." Before long the present Librarian will have to say the same; Dr. Boorstin has found that bursting is nothing new but is a fact of Library life.

Dapper Dan Boorstin came to his $50,000-a-year job —running an organization that spends some $200 million a year—a little over four years ago with zest, a stock of snappy bow ties and plenty of credentials as a scholar, teacher and administrator, though none as a librarian. He came out of the public schools in his native Tulsa, went to Balliol College as a Rhodes Scholar, was admitted to the English and Massachusetts bars, spent a quarter of a century on the University of Chicago faculty, held visiting lectureships at several universities here and abroad, was director of the Museum of History and Technology and senior historian at the Smithsonian Institution, and over the years wrote a dozen American history books, winning a Pulitzer Prize en route. He was 61 when Gerald Ford nominated him on June 20, 1975.

The appointment, subject to "advice and consent"

Librarian Daniel J. Boorstin stands on balcony above giant jewel of his domain, hushed main reading room.

Photographs by Yoichi R. Okamoto

The Library "brass" visits atrium in new building. From left: Law Librarian Carleton Kenyon, Register of Copyrights Barbara Ringer, Associate Librarian (management) E. L. Applebaum, Associate Librarian

from the Senate, did not go unopposed. As it had been over Franklin Roosevelt's choice of Poet Archibald MacLeish in 1939, the American Library Association was hostile to Dr. Boorstin, and for the same reason—that he was not a professional and one of their own. Some Senators saw a conflict of interest: how could he run a vast organization and still pursue his writing career, and which would come first? He quelled the objections by saying he would put in full time or more as Librarian, but would feel stubbornly free to write on his own time (he needs little sleep and now gets up early to work at home on a world history) and to use the Library like any private citizen.

A third source of opposition, the black unions at the Library, did not even exist in MacLeish's time. A big majority of the Library personnel, like a big majority of Washington's population, is black and most of these "minority" employees are in low-grade, some in dead-end, jobs. The unions made their point, that nothing in Boorstin's record indicated he would be very affirmative in dealing with their members. But Boorstin's point prevailed, that he was for equal opportunity from the ground up but was against quotas for anybody, whether black, Hispanic, Oriental or Wasp. Overwhelmingly, he was confirmed.

He has called what he inherited "the most complicated institution in the world." It had a reputation of being stuffy, closed-off, unapproachable. Boorstin appointed a staff task force to find ways to shake it up. Some of the changes he has made follow their recommendations, but for the concurrent staff rejuggling—most of the Library's high command today (above) are his appointees—he takes responsibility.

"I found out," he says, "that to be *the* Librarian you don't have to be *a* librarian." It did not take a librarian to figure out that the great bronze front doors to what had been Quincy Mumford's fortresslike fief should be kept open ("They said it would make a draft, and I said that's just what we needed"). Or that picnic tables should be installed out front, around the stately Neptune Plaza and pool. ("At one time they had a rule around here that nobody could leave the building for lunch. Imagine!") Or that human "reader's guides" and handy computer terminals, not forbidding blank walls, should greet arrivals in the main reading room, under the high rotunda.

He is not by any means through. He is setting up a Council of Scholars, 25 people who will individually

D. C. Curran, CRS Director Gilbert Gude, Associate Librarian (national programs) Carol A. Nemeyer, Deputy Librarian W. J. Welsh, Assistant Librarians J. H. Howard (processing), J. C. Broderick (research).

ferret out the Library's "areas of ignorance" and meet twice a year to goad the Library into correcting them. As a book man in an age when other media are competing, and then some, with print, he has set up a Center for the Book to encourage reading, which he likens to "the sex act—done privately, and often in bed." He has even enlisted television in this effort, via a CBS "Read More About It" tailpiece by leading actors in special shows. Next winter he aims to convert the Library's quarterly journal (present circulation 5,000, only 1,000 paid) into a more popular magazine, re-

christened *LC,* with a starting goal of 50,000 copies an issue and with John Y. Cole, head of the Center for the Book and a reorganizing task force member, as editor.

"Outreach" is the word for all this, and as part and parcel of it, Boorstin not long ago held a day-long celebration of the 1939-1944 "MacLeish era" at the Library. A handsome and lively 88 today, MacLeish (p. 43) was there to hear himself described by former colleagues as not only a great poet, which everybody knew, but—surprisingly—the best administrator in anybody's memory. The day of talk was recorded, of course, for the Library's oral history archives.

Boorstin will have a balconied office in the new Madison building, and will use it though he doesn't much care for it ("too corporate looking"), but he has no intention of giving up his present minidomed, elegant place of business. It is on the main floor of the old building off the Great Hall, behind a marble wall incised in gilt letters with his name and those of his 11 predecessors. Inside, below a bevy of muraled maidens, he works behind a desk that was built for the room, near a comfortable sofa and a conference table big enough for his intimate luncheons wheeled in from the Library's cafeteria. Standing in a corner and looking incongruous, there is a computer terminal linked to some 800 of its fellows and bearing his ID number, A 129. There is also a bar, and after lunch he offers his guests good Dunhill cigars.

Ninety minutes is not enough

A high-profile man, he likes to do things with style and encourages his staff to do likewise, not to retreat behind anonymity. A recent black-tie "Circle of Knowledge" dinner he staged in the Great Hall (p. 42) was typical. It opened an exhibition of old and new encyclopedias and provided a perfect excuse for Boorstin to remind his hundreds of notable guests that the Library is "a multimedia encyclopedia." Everything about the affair was done with a flourish uncharacteristic of the old days; the exhibit catalog, the invitations and even the place cards were executed in matching calligraphy.

He had Sir Huw Wheldon to lunch last year, after a closed-circuit preview of Sir Huw's 90-minute BBC film on the Library. Ninety minutes, the British producer observed wryly, was far too little to do justice to a subject much more ramified than anything in his own country. (Holdings of the Lenin Library in Moscow may rival those of the Library of Congress, but the Soviets do not deign to disclose standard statistics about their collections.)

Time was when a 60-second spot would have been more than enough. That was when President John Adams, in 1800, approved a $5,000 appropriation to

buy some books for Congress' use. The books were gathered in England, not much being published in early America if you exclude Tom Paine and such pamphlets as the Federalist Papers, and were shipped in 11 horsehair-covered trunks because, unlike packing boxes, trunks could be resold, as these were.

That same year the seat of government was moved from Philadelphia to humid, swampy Washington, and the 740 books were installed in a "suitable apartment" in the new Capitol. Accidentally or on purpose, the British burned the books as well as the building in the War of 1812. Congress went bookless for a few months until, after much debate, it voted $23,950 to buy most of ex-President Thomas Jefferson's personal library. He had assembled it with great care on trips abroad and suggested that in it "there is, in fact, no subject to which a member of Congress may not have occasion to refer." His precious books were sent from Monticello to Washington in ten wagonloads, and from there on the Library just grew and grew.

Spofford's birdbaths and magazines

Ainsworth Rand Spofford, a onetime Cincinnati newspaperman, was the person who made the Library a one-bureaucracy growth industry. In his incredibly long (1865-1897) and highly acquisitive career as Librarian, he acquired three things that guaranteed him, his successors and his country the world's vastest assemblage of research materials. One was the 40,000-volume scientific Smithsonian library, which he took off the Institution's hands when it decided to be a collection of museums and not of books. The second was to gather unto himself in 1870 the national copyright office by getting the law passed that created it. This meant that forever after, by law, the Library of Congress could take its pick from the millions of items (aprons and birdbaths, as well as new books and magazines) deposited each year for federal copyright. The third thing was his monument, the palatial $6-million building that gave the Library, for the first time, a home of its own. It settled in with 800 tons of material, brought in on horse-drawn carts.

Erected in a more ebullient and flamboyant age, the Library as it is would never be built today, but present generations can be grateful that it was built the way it was, when it was. The exterior is three stories of rugged New Hampshire granite, guarded with an army of busts and surmounted, like the nearby but loftier U.S. Capitol, by an immense dome. Inside, it is all cavernous halls and grand staircases of polished marble, everywhere decorated with lovingly crafted sculptures, paintings, ceiling mosaics inlaid with such evocative words as "home," "science," "family," "knowledge." Large glass cases hold such treasures as a Gutenberg Bible and the Giant Bible of Mainz.

Far below the dome, in the perhaps overembellished and certainly overwhelming main reading room, are desks where scholars labor in silence, many hoping no doubt to achieve best sellers such as Herman Wouk and Alex Haley wrought here. In the middle of this main reading room is the counter where they leave their call slips, copied from a nearby, many-thousand-drawer card catalog. Then they wait, an average of 55 minutes nowadays, to get the book they want or to learn it is "NOS," meaning not on the shelf. That can be good or bad: if the book is being used, by a Congressman or a scholar or a staff person, all to the good. If it has been lost, misplaced or stolen, and nobody knows how often that happens, not so good.

This "Circle of Knowledge" dinner in Great Hall opened an exhibition of old and new encyclopedias.

Out beyond the rotunda and somewhere down below are the book stacks, 40 "decks" of them, some well ordered and some, known as the slums, well littered with books and papers crowded off the shelves. Scattered among the stacks are some 200 spaces for the "desk set," scholars more favored than most, who get to keep their books and writing machines on the premises for long-term projects.

Spofford would feel at home here, though he would join his six successors in lamenting the dozens of temporary partitions that have defaced big parts of the noble old building as needs have grown for office space. Boorstin intends to tear out the offending partitions as part of a general "denovation" (his word) when people move out and into the new building.

Former Librarian Archibald MacLeish, right, chats at fete in his honor with ex-colleague David C. Mearns.

Rehearsing in shirt-sleeves with accompanist at piano, Juilliard String Quartet plays Library's Stradivaris.

Six successors in 83 years is 14 years per man, and that is a testament to the durability of Librarians of Congress. While none has been more brilliant than Archibald MacLeish, who went on, after his five years, to be Assistant Secretary of State, two have shown great staying power. One was Herbert Putnam (1899 to 1939), who in 1925 acquired the Coolidge auditorium as a gift from Elizabeth Sprague Coolidge, and in the 1930s five matched Stradivari stringed instruments as a gift from Gertrude Clarke Whittall. (The priceless strings are still played, regularly, by the Juilliard Quartet in chamber music concerts in the intimate auditorium.) He also fought long, hard and in the end successfully for the Library's giant bookstack, the Thomas Jefferson annex, with a ten-million-volume capacity. The other indestructible man was Quincy Mumford (1954 to 1974), like Putnam a professional librarian from a big-city system, Cleveland in his case, Boston in Putnam's. In Mumford's time the new Madison Building took shape, and the Library grew mightily in wisdom and stature, in automation, in complexity.

And whose library is this?

Yet a basic question about it had never been answered and possibly was unanswerable: was it Congress' or the nation's? Every study of it has urged that it be recast as the National Library and moved from the legislative to the executive branch of the federal government. Presumably that would stop the tail—Congress—from wagging the dog, the rest of the nation. But there are compelling reasons for continuing the mixture as before:

As a White House agency the Library would be subject to the up-and-down vagaries of the executive budget. Its Congressional Research Service, an essential reportorial arm of the Senate and House, could wither. As a legislative branch, it is independent of executive-set foreign policy; much of its invaluable accessions come from "closed" parts of the world with which the executive branch, at one time or another, has refused to do business or from which it has been more or less excluded.

For example, there is a house in Cairo's "Garden City" which King Farouk used to visit nocturnally to play poker. Now Farouk is long gone and so is suburban quiet; the neighborhood has been swallowed up by downtown hustle-bustle. Mike Albin, a fluent-in-Arabic librarian transplanted from the University of Texas, works here with a staff of 30 Egyptians, gathering material from the Arabic countries (250,000 items a year) to ship off to the Library of Congress in Washington, D.C.

With his wife and two-year-old Cairo-born daugh-

Perched on a stool in a reference alcove off balcony of the Library's main reading room, solitary scholar is absorbed in his research.

ter, Albin lives two blocks away in an apartment overlooking the Nile. He spends his working time among booksellers and publishers of the region. In spare time, the Albins visit with Egyptian government people and with the stream of foreign academics pouring through the volatile Middle East to learn more about Islam and expose themselves to Cairo's boomtown chaos.

"Scope lists" of things *not* to collect (translations, "kiosk literature," textbooks below college level) have lightened the burden somewhat for Albin and other operatives in such outposts as Karachi, Djakarta, Nairobi. They still funnel millions of books, magazines, maps and official documents to America.

One may feel that this omnivorous scooping-up is a waste of time, but one never knows. By hanging onto rainfall records from Burma, the Library made it possible for American pilots to fly the Hump in the CBI Theater in World War II. As Boorstin says, "You must collect things for reasons you don't yet understand."

When in Washington, Albin works in one of five divisions of Area Studies. Fifty-two divisions, overall, are what Boorstin has reorganized his domain into, in an effort to construct sense, or at least logic, out of an empire that makes the Pentagon maze seem like relatively simple stuff.

Above: Researcher looks up books in the main card catalog. Now holding more than 21,000 trays, index overflows into hallway and beyond.

Up to their ears in papers and books, inquiry handlers at Congressional Research Service labor in a scene of controlled pandemonium.

Ten of the divisions (pursuing such specialties as science-policy research, foreign affairs, national defense, American law) are gathered in the Congressional Research Service (CRS), a hefty arm of the Library with 868 employees, a few of whom already have moved into the James Madison Memorial Building. Some of these workers answer telephones in a bedlam area where inquiries—2,000 a day when Congress is in session—flood in from the people on Capitol Hill. The Research Service prides itself on answering nine out of ten questions ("Where's our most recent map of Afghanistan?" "What bills have been introduced lately to deal with gasoline rationing?") within the hour, or at the most overnight.

Almost 30 million dollars a year, a sixth of what the Library spends, is what CRS costs Congress—its only constituency—and the taxpayers. The man in charge of seeing that Congress gets its answers and its money's worth is Gilbert Gude (pronounced GOO-dy), 57, a graying bear of a man whose five terms as a Congressman from Maryland helped fit him for the job. A Latin inscription, in big letters, is mounted on the wall over his door: MINISTERIUM CONGRESSIONALE DE STUDIIS.

CRS is necessarily nonpartisan and in most of its myriad "issue briefs" and other reports it presents the pros as well as the cons. When a Congressman or committee staffer wants just one slanted side of a story, every sheet of what he gets comes labeled, by Gude's command, as "directed writing." Also, every CRS report is signed; that fixes responsibility and makes it simpler for the receiver to go back to the source.

A welter of acronyms, starting with LC itself, enmeshes the Library of Congress. The Research Service, CRS, is no exception. Millions of bits of information have been programmed into its computers; to extract them, CRS uses a system called SCORPIO, the acronym for Subject-Content-Oriented Retriever for Processing Information On-Line. To search out a fact from SCORPIO's voluminous files, a CRS employee, from a worker-bee inquiry clerk to an advanced-degree senior specialist, simply goes to a computer and tells it to SLCT, for select, or BRWS, for browse. In seconds, the answer comes back on the screen.

Another fifth—that is, about $35 million—of the LC budget goes to a single division of the 52, the National Library Service for the Blind and Physically Handicapped. It is an empire in itself, its seat being a building in a grubby corner of Washington and its outposts 160 cooperating libraries around the country, a network it has built over half a century. Its clientele, 600,000 of perhaps three million citizens who are blind

Division Chief Erik Barnouw with cans of film in his stacks.

Prints and Photographs curators hold examples of their collections.

Geography and Map Chief John A. Wolter with early globes.

or otherwise handicapped, is a small slice of the American population. But as another Library executive says, "You can't vote against these people any more than you can vote against motherhood," and Frank Kurt Cylke, who runs the division, does not disagree.

The service (there is no acronym for it) does a lot. It distributes phonograph records and cassettes, and designs the machines to play them. It puts out large-type and Braille versions of best sellers along with magazines, from *Ranger Rick* to the *Atlantic*, though Cylke notes that most of the blind can't read Braille. It hires narrators to record books for the sightless (opposite). It was instrumental in developing the LP record and was putting music, as well as speech, on 33 rpm records five years ahead of the commercial industry.

"Chief jewel" of the Library is what Archibald MacLeish called the Manuscript Division. Strolling its stacks "is kind of like you're walking down the halls of history," says Paul T. Heffron, the chief and a man who knows his history, once having been chairman of that department at Boston College.

In thousands of boxes, Manuscripts keeps the papers of 23 Presidents, from Washington, Jefferson, Madison and Monroe to Calvin Coolidge. (Nowadays Presidents house their papers in home-state libraries of their own, like Lyndon B. Johnson's in Austin, Texas, all being parts of the National Archives system.)

On file here is Jefferson's 1823 note declaring it "the duty of every good citizen to use all the opportunities, which occur to him, for preserving documents relating to the history of our country." Here, too, are Theodore Roosevelt's college-days diaries, the papers of Sigmund Freud, those of the late Supreme Court Justice William O. Douglas and, now being microfilmed, those of Booker T. Washington. The only surviving original manuscript page of Walt Whitman's *Leaves of Grass* has been sent to another division for much-needed preservation work.

Last year Manuscripts "accessioned," a library term, more than two million items, not counting the papers of Henry Kissinger, now tied up in court but acquired in theory, meantime, by Librarian Boorstin. The great collections are uninsurable; not even Lloyd's of London could put a monetary value on, say, the 65,000 papers of George Washington, reproduced on 124 microfilm reels.

The same goes for the incredible collections of the Music Division, including not only the regularly used Stradivari instruments and an Amati violin that any qualified visitor may play, but also a hoard of some 1,600 flutes, one of solid gold, amassed by the late physicist Dayton C. Miller.

By accepting the idea that foundations and funds may channel money into the Library, Congress has made various divisions, including Music, less dependent on the public purse. Miller money maintains the flutes, Gertrude Whittall money the Strads, and a bequest from Elizabeth Coolidge finances the Juilliard chamber music in the auditorium named for her.

The division also has perhaps the world's largest batch of original scores in the hand of Johannes Brahms. As Don Leavitt, its chief and the chief guardian of its treasures, says, "We don't get rid of *any*thing, and therefore we come closer than many divisions to having the whole ball of wax." Including popular music, tons of it routed here from the Copyright Office.

And what does the U.S. Copyright Office do? It administers the federal copyright laws: easy to say, hard

Recording for blind, a narrator is monitored through glass.

Catalog distribution center sold 20 million cards in 1979.

A conservator gets ready to repair cylindrical mirror, part of an artwork.

to do. By tradition and by laws even older than the Library itself, the principle of copyright was established to protect the right of the creator of a work not to have it copied, or stolen, by some piratical non-creator without permission or payment.

Barbara Ringer, the Register of Copyrights, knows the laws inside and out and as a shrewd lawyer and bureaucrat knows about individual rights too. A decade ago when her predecessor retired, she thought she had been promised his job—but didn't get it. She filed a discrimination suit, and while it was pending went off into what she calls exile, to handle international copyright matters for UNESCO. In time she won the suit and the job, and returned from Paris to Washington in well-concealed triumph. Before and after that, she has been aggressively on the side of authors, not conglomerates, and their rights.

The father of international copyright, by the way, was Victor Hugo, who pioneered the Bern Convention; it gave broad protection to creators where American laws had always favored bigger, special interests. Ever since 1924, there has been a struggle to change that. In 1955 Congress at last gave the Copyright Office the mandate and the money needed to get a new and better law prepared.

The result, after hundreds of meetings and skirmishes, and years of "resting" in the U.S. Senate, was the copyright law of 1978, the first to favor creators rather than "the interests." Among many other things, it requires jukebox operators and cable TV companies to deposit performance royalties with the Copyright Office; an impartial tribunal is charged with the job of dividing up the money for the copyright owners of songs and shows.

By getting the copyright function assigned to the Library a century ago, Librarian Ainsworth Rand Spofford added immensely to the work load. The new copyright law, conferring great regulatory powers on the office, has added more. But it has all redounded to the enrichment of the Library. Not that the institution keeps "everything published," as a popular misconception would have it, but it has its pick. Every day, selection officers comb the thousands of incoming items to winnow out what may be accessioned from what will be squirreled away in a warehouse, or will be discarded.

And now, have another acronym, MARC, short for "Machine Readable Cataloging," the system that married the Library of Congress with the computer age. Ever since 1901, not as mandated by law, but out of the goodness of its heart, LC has been printing its catalog cards by the millions for other libraries, saving them vast amounts of time and money. After MARC came along, computer-equipped libraries and commercial firms could order reels of tapes and print their own cards from them. (The system will not put LC out of the catalog-card printing business, because many libraries are not equipped to print cards from tapes.)

At the Library, Henriette Avram is known as "Mother MARC" because she has nurtured machine-readable cataloguing from its infancy. Today she runs an LC division called the Network Development Office, which is trying to set up a national and international chain of libraries that can "talk" to each other via computers and telephone lines, exchanging and sharing information about books—all, of course, speaking the same standardized language, whether in English, Hebrew, Cyrillic or whatever kind of characters.

Even for a library-using layman, the implications of reducing Babel to a common tongue understandable by libraries everywhere are tremendous.

Libraries everywhere, and certainly the Library of Congress, are engaged in a race against time. For a century, most books and periodicals have been printed on paper—including the paper on which you are reading this—made not from rags but from wood pulp. It is acidic, and in time, 50 years more or less, it turns brown and brittle and falls apart. Before that happens, LC is striving to microfilm everything that is perishable. It also is experimenting with gas deacidification processes that use toxic chemical vapors in sealed chambers to lengthen the life of printed matter.

Meanwhile, the Library possesses the world's biggest collections of dime novels and comic books, a complete set of Dell paperbacks, and numberless hardcovers of this century—all doomed in time to become "brittle books" and disintegrate.

So you see, the Librarian of Congress has his worries. Despite the urgings of the study groups, the Library probably will continue as "LC" to serve a potpourri of constituencies: the Congress, for which it responds to 300,000 member and committee inquiries a year; the heads of federal agencies, including the Supreme Court (LC has the largest and finest law library in the world); the country's thousands of libraries; visiting scholars; and the library-using public at large. In that order.

Remember, a number of things set it apart from your local public library: the CRS, whose only counterpart in any parliamentary democracy is in Japan; the Copyright Office, now bigger than ever since the 1978 copyright law made it the receiver of millions of dollars in jukebox and cable TV royalties; and the far-flung function under which the Library gobbles up material in 468 languages on the one hand, and on the other sells its millions of microfilms, catalog cards and magnetic tapes to other, smaller libraries everywhere. Also it is a research, not a lending, library. Anyone can walk in to see a book, document or map, without a library card, but only a chosen few, limited by law, can walk out with a borrowed item under the arm.

The Library of Congress is an unbelievably complex anthill, if you will, or a giant iceberg of a bureaucracy, and all the foregoing has only scratched its tip. Librarian Boorstin wants it to be less cold, more open to the nation, and he is not alone.

Elizabeth Stroup, his director for general reference, has done a great deal to help. As a member of his reorganizing task force, she made herself heard, loud and clear. Partly as a result of her efforts, a friendlier and more helpful atmosphere greets library users today in the main reading room and elsewhere. To relieve lonely, deadly dull days in the windowless stacks, "deck attendants" now get a chance to come up for air by being rotated for meet-the-public duty in the reading room. Part-time attendants are being hired for stack work that can be as monotonous as filing new cards in a catalog, a task that a Library guide says "can drive anybody out of his or her mind in an hour or so."

In the course of her career as a professional librarian, Liz Stroup spent years serving the needs of youngster and grownup users of little public libraries out West. "My dream," she says, "is to make service in this library in Washington, D.C., as warm and personal as in the library at Peshastin, Washington state."

Norman Weberg of Preservation Office takes plastic-wrapped books from experimental fumigation area.

"Brittle book" flies apart as conservator Peter Waters blows on it. Slowing decay is major Library job.

By David Nevin

Scientist helps stir new movement for 'animal rights'

Former wolf researcher Michael Fox gives impetus to crusade for more humane conditions on U.S. factory farms and in laboratories

Animal rights advocate Michael Fox keeps wolf Tiny, the last survivor of research pack he once studied.

Dangling from mechanized conveyor, factory-farm chickens are sped to slaughter at 128 birds per minute.

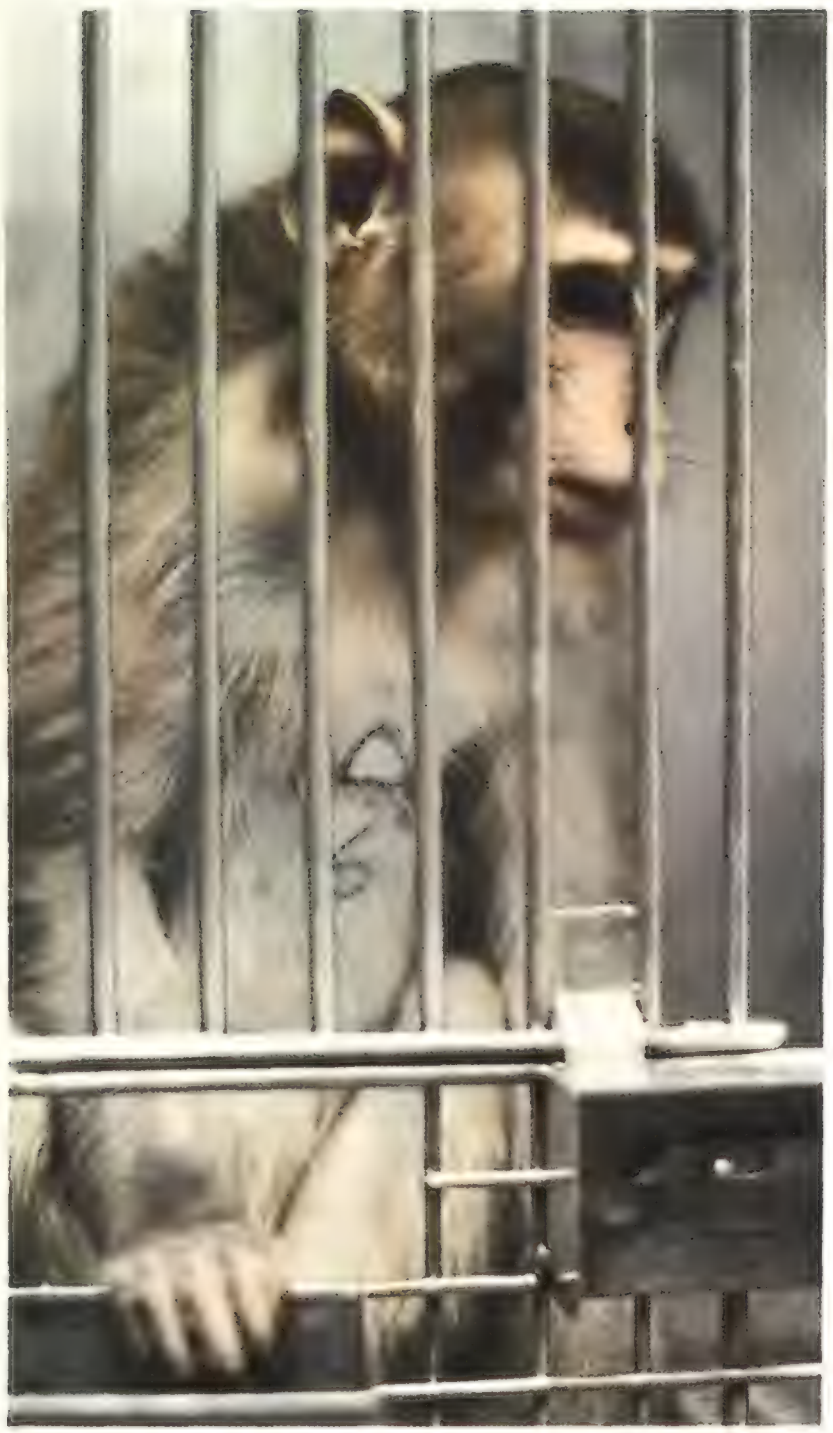
He comes swinging through the park, a slender man with a drooping moustache and a very quick smile, and pulling ahead on a long strap leash is a *wolf*. You don't expect to see a wolf in a city park in Washington, D.C., so you ask him—it's really a dog, is it not, just an odd-looking dog, leaner and larger and more feral than most dogs?

"Oh, no," he says in an impeccable British accent, most professional, most assured, smiling, "it's a wolf, left over from a research pack. I studied wolves and their behavior for years. This is the only one left."

He introduces himself: he is Michael W. Fox, veterinarian, animal ethologist, scientist, crusader for animal rights. And readily, there in the park, with the wolf gamboling at the end of the leash as people stop to gape, he ticks off in his crisp accent the obscenities that an ever larger, ever more sophisticated and technological culture works on animals today. He used to be part of that world and its effects obsess him. Now he intends to change it. There are a great many people with similar views who make up the new animal rights movement.

It is a movement that is growing rapidly, at a time when Americans are rights conscious and action

Gadfly for animal rights



A tattooed monkey is kept isolated in laboratory cage, common practice in this country. But U.S. cages are half the size of recommended standard in Britain.

In the "Draize test," rabbits are restrained in stocks as new cosmetics or other chemicals are put into their eyes to check irritancy, sometimes causing severe pain

oriented; it fits with our concern for our environment, our air and water and food. If we care about rights, worry about endangered species, question the carcinogens that appear in our fields and our food, can we be unconcerned about the means that lie behind the pale white egg we crack into the skillet?

What obsesses Michael Fox is the range of abuses routinely inflicted upon livestock and laboratory animals, the almost random examples of unnecessary suffering that are all too easy to find.

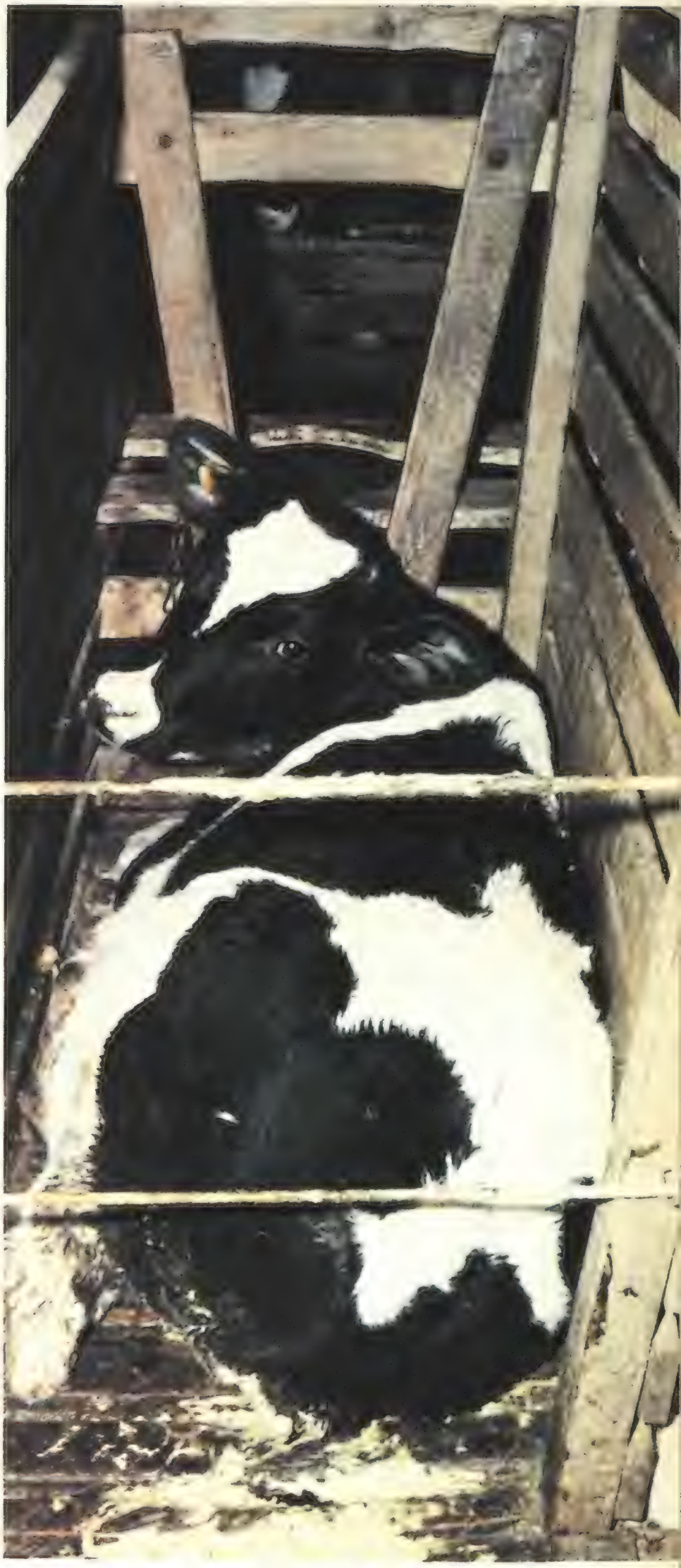
An East Coast research laboratory, for example, autopsied animals used by the military in developing a non-lethal missile, at a time of intense interest in domestic riot control. According to a lab assistant who is now a veterinary student at Colorado State University, researchers fired various projectiles—Ping-Pong balls filled with water, three-inch water balls, hard rubber balls—with varying force at anesthetized baboons and pigs. The pigs took body shots. The baboons took a series of shots to the head—either the forehead, back, or side. "The baboons bothered me most," said the former lab assistant. "I liked the pigs, but the baboons had fingers and fingernails—they were more like

and blindness. Animal rights advocates protest that many of 400,000 rabbits used in U.S. labs yearly are injured testing products that duplicate existing ones.

humans. Sometimes I brought my flute and played for them and they liked that."

The researchers killed about ten baboons a day. The animals were anesthetized, strapped in chairs, impacted (as it was phrased) and recaged. The most seriously injured animals were killed at once, but others were required to live overnight before they were killed. When the anesthesia wore off the baboons sat crouched, leaning against a corner, eyes hooded, sad, ill, unable to eat or drink. They were given no analgesics. Sometimes the assistant would ask if they couldn't be given pain-killers, because he was convinced they were suffering. "Made no sense to me—wouldn't the rioter who had been hit in the head take an aspirin?"

If research animals sometimes seem to be the victims of our progress, many farm animals are faring no better. A Virginia farmer has just gone into the veal business. He is a smallish man, a former conscientious objector who owns six-and-a-half acres. The plot is too small for real farming, so he built a veal confinement house, a windowless warehouse of cinder blocks that contains 80 chutes made of oak slats. Each chute is 24



In confinement house, a veal calf spends its entire 16-week life in chute 24 inches wide. It lives in dark about 22 hours a day to minimize its motion.

British cattle often graze on open-range grasses until slaughter, as on this Derbyshire farm. This is more efficient use of energy, argues Fox, than practice of "finishing" cattle on grains that people could eat.

inches wide. In each, on this day, was a five-day-old bull calf. Dairy cows are impregnated regularly to keep their milk flowing. Heifer calves are kept for milk cows and bull calves become veal. But first—in the modern veal systems—they will live for 16 weeks in a chute like those on this Virginia farm. The farmer has a frightening investment and he obeys the rules of the feed company, which for the first year supplies the calves, the feed and the medication, on which he depends. Each animal is chained in place. The calf can back up 12 inches and he can thrust out his head to eat the high-intensity mash made of milk solids low in iron. (This diet induces anemia, which results in the white meat prized in veal.) The chute floor is of slats. It is rough when he lies down, for it has no straw, which would interfere with the cleaning and which he would eat, since at about three weeks he requires roughage to develop his rumen. The calf learns to brace his cloven hoofs against the cracks and his leg muscles develop for bracing instead of walking. The lights are on only at feeding time; the calf lives in darkness 22 hours a day; this reduces motion, and is said to produce more tender meat. The calf can barely move—he stands perpetually in one position or else he lies in his cold feces.

So he will live out his allotted 16 weeks of life in darkness, almost motionless in a cage the size of a coffin, and he will never have turned or stretched or run or touched another calf or had a bit of roughage, and when he comes out for slaughter on untried legs, he may fall down. And you may say, well, he had food and shelter and has known nothing else and who knows what a calf wants anyway? But stand before the cages of this veal confinement house and present a knuckle—and the little calf will thrust out its head and suck your knuckle with instinct so desperate that you will have your answer.

The cruelty of such isolation is matched by the bucolic bedlam in which modern hens are kept. After a lifetime in the egg business, another Southern farmer finally put his hens in battery cages, which is the method used in at least 90 percent of American egg production.

For years his hens had lived in 38 separate houses, scratching about in the yard by day and roosting by night. The houses stretched up and down the hills of his farm near Chesapeake Bay. But his old father, who always resisted change, went into a nursing home, his sons weren't very interested, hired hands were hard to find and he couldn't handle alone the awful labor of 38 separate chicken houses. He built two long, narrow barns and installed standard laying-hen cages.

He is a small-scale operator by the standards of the modern chicken industry; he has 10,400 birds. The cages are in long banks. Running along each bank is a trough carrying water and a small conveyor belt carrying feed. The cages, with no perches, are made of wire mesh which allows feces to fall through. The mesh catches eggs, which roll forward for collection. The birds come from a pullet house where they are debeaked—each beak pressed to a hot iron to blunt the end, which reduces pecking damage. Sometimes a careless operator burns off most of the beak, but that is undesirable since such a chicken has trouble eating and will lay fewer eggs. Each cage is 12 by 18 inches and four birds are put into each. Four chickens are crowded in a space 12 by 18 inches, so they scramble, pecking and clawing each other, and one of the four generally is on the bottom. In a minute or two the down chicken will lunge upward and, in the ensuing

David Nevin, a frequent contributor, wrote about the first nonstop transatlantic flight, by Alcock and Brown, in the March issue. He is now writing a novel.

On giant Colorado feedlot, cattle spend last 120 days being fattened for market on diet of rich grains and antibiotics (to stimulate growth, prevent disease). Average American eats 126 pounds of beef a year.

turmoil, another of them will be forced to go under.

The lights are on 18 hours a day to encourage the chickens to lay constantly. And it is a disastrous anomaly for the chickens that under these hellish conditions, egg production rises. Each hen averages an egg every 32 hours for 14 months and then goes to slaughter. And if the cages and the lights and sheer hard *use* of the birds seem like a scene conceived by Dante, well, who really is to say what a chicken wants?

Most people would agree that animals have rights, but there is far less agreement on what those rights are, or how far they extend. Nevertheless, the new animal rights movement is attempting to define those rights, not simply as matters of faith or philosophy, but of science. Michael Fox, who runs the Institute for the Study of Animal Problems in Washington, D.C., points out that rights imply a grasp of the animal's intrinsic nature and its needs. It is inhumane to deprive an animal of its natural needs, he says, just as it is inhumane to inflict unnecessary pain.

Adopting a simple code first proposed in England, Fox suggests that all farm and laboratory animals should be granted five basic rights, or "freedoms": the freedom to be able easily to get up; lie down; turn around; stretch; and groom or preen. Social animals, he points out, should have a right to some kind of social interaction. What rights does a veal calf have? "Veal calves have eyes and legs," Fox says, "therefore they should have light to see by and sufficient freedom to move." This is not determined by scientific research, he adds. "It's obvious."

It is from these new perceptions that the animal rights movement is developing in the United States and Europe. It arises in direct response to the ever vaster and more impersonal systems provided by technology and mechanization that dominate modern agriculture and have made the old idea of barnyard animals an anachronism. It grows from the humane movement, but has gone far beyond it. Its broad umbrella includes the antivivisectionist groups, but its modern approach and its emphasis on incremental change make it much different from the strident old agitation. It has an intellectual rationale, it is taught in universities, it has adherents that probably number in the millions. And it has Michael Fox.

A graduate of the Royal Veterinary College, doctor of philosophy in medicine and doctor of science in ethology from London University, Fox is an intensely practical man. As an advocate, he brings an immense array of scientific facts to the battle.

Yet the issue of animal rights is so fraught with emotion that this scientist-crusader is written off as a sell-out by some radicals in the movement, and regarded as a radical by moderates who fear his activism will destroy everything they have accomplished in the past.

The man who inspires equally choleric views in such opposite quarters (which attests to his centrist position in the movement) lives with his wife, Deborah, a psychiatric social worker, in a Washington town house. In a cage out back, with a mongrel dog for companion, lives the wolf, Tiny, a refugee from the wolf study at Washington University in St. Louis that made Fox's scientific reputation. She is a pleasure and, Fox insists, a teacher—but not a pet. As a professional, Fox warns against the dangers of keeping wild animals as pets and he handles Tiny with great care.

Fox was born in northern England in 1937 and quickly developed a predilection for science. In graduate school he moved through animal neurology to the study of animal behavior and on to animal ethology, the new field generated by Konrad Lorenz, just as serious work was beginning. Animal ethology is the study of animal behavior—the nature of the animal—done in terms of its environment. It is that emphasis

on the animal's nature that makes Fox effective today.

Fox came to the United States in 1962 for a research fellowship in Maine. Then he went to a research hospital in Illinois and on to a professorship in psychology at Washington University. His work in canid ethology—specifically, examining the effects of domestication on dogs compared with wolves—led to his second doctorate from London University and a growing reputation. But it also led, in that era of campus protests, to serious self-questioning. He read that wolves were being destroyed in Alaska, and it made him think. His wolf pack, of which Tiny was a member, was giving him everything—knowledge, reputation, academic honors. What was he giving the wolves? Nothing, really.

About this time John Hoyt, president of the Humane Society of the United States, was putting together the Institute for the Study of Animal Problems. The trouble with the old humane approach, Hoyt thought, was its lack of scientific rigor. Humane advocates were often accused of emotionalism or of the anthropomorphic tendency to vest animals with human characteristics and desires. The use of animals in America is rooted largely in science. Laboratory studies aim at scientific analysis or discovery. The livestock industry depends on science—drugs, chemicals, genetics, animal sciences—for ever greater production. What animal rights needed, Hoyt thought, was its own scientist—and Fox proved to be just the man he was seeking. The institute opened in late 1976 with Fox as its director.

Vast numbers of animals are involved in the problem. American laboratories use some 20 million animals a year, of which about 18 million are rats and mice. The livestock industry handles 4 billion creatures a year, of which 3.5 billion are poultry.

Fox's role is a natural for an ethologist because his training is to see the animal as an animal. In our increasingly production-oriented, remote, antiseptic, scientific time, this is not so easily done. People who use animals today are more likely to see them as production units.

In factory farming, all the emphasis is on economies of scale, mechanization that reduces labor costs and maximum production per unit of time. The laying hens in their tiny cages become egg machines—feed them, water them and collect their eggs. The lights are on unnaturally long hours to make them lay more, just as there are experiments to make beef cattle and other animals eat more and thus gain faster. Total confinement pig barns may be the worst abuse of all, for there sows live for years chained alone in cages while they nurture litter after litter of piglets. Like veal calves they never touch each other—and anyone who has ever seen pigs nudging, scratching and licking each other in a pen will understand the deprivation. "All animals engage in social grooming," Fox says. "It is absolutely basic to their lives. It keeps them neat and healthy, but even more important, it is their basic mode of social interaction—which is the trouble with isolating them, you see. When you break those patterns, that's real deprivation, and it makes for much less healthy animals too."

The costs of feeding our 'protein habit'

Taking a broader economic view of factory farming, Fox sees the issue of exploitation as only a facet of an environmental crisis rooted in our diet. On the average, Americans are eating twice as much animal protein as they need, which is not only a luxury but a hazard to their health, increasing the risk of heart disease, colon cancer, stroke and other ailments. In order to maintain this protein habit, most of the modern system of farming is geared not to provide food for people but to provide food for farm animals. More than 80 percent of our corn, barley and oats is fed to livestock, he says. As a result, we are using five to ten calories of fossil fuel to produce one calorie of food, because of the energy (petroleum, fertilizers, etc.) to raise the crops. Fox points out that if the entire world were fed based on our energy-wasteful food system, according to the calculations of Professor David Pimentel of Cornell, the world's known petroleum reserves would be gone in 13 years.

"It is ecological and economic suicide to continue this," Fox says. "If we were to reduce our farm animal production to half the amount, we would be healthier, there would be less soil erosion, less pressure on the land, less pesticides, herbicides and fertilizers, all derived from fossil fuels, and food would be cheaper."

Fox is not preaching vegetarianism (which is one

Sows kept in confinement on this Midwestern factory farm eat, sleep, are artificially inseminated in pen. They leave pen only to give birth—in a narrow crate.

Broiler chickens, in flocks of 10,000 to 75,000 birds, get less than a square foot of living space each in a vast house; they may suffer hysteria, cannibalism.

reason some animal rights advocates consider him a sellout). "In a highly technological society," he insists, "it is sound to eat some animal products, because we have a lot of industrial and agricultural byproducts that can be recycled through animals, including carefully refined sewage sludge. Underneath all the human ethics, we must address the ecological underpinnings of it all: we should produce animals and food in order to minimize ecological impact. The main flaw in the animal rights movement so far is that it has not realized this.

"If some animal liberationists had their way," Fox adds, "they would let all farm animals loose, and have them out free ranging. That would mean more destruction of natural habitat, causing greater ecological imbalance than we have already. All animals have a right to humane treatment, but there is only one absolute right, the right of all life to a whole and healthy biosphere, and that implies ecologically sound strategies as well as a humane ethic."

Fox argues with similar moderation for reduced use of animals in scientific research. "The Humane Society is not antivivisectionist," he says, "nor am I. Our policy is that animal suffering is justifiable if it can be demonstrated that it is going to alleviate a greater suffering in other animals or man." The problem is that the same "intensive use" which characterizes factory farming also runs through the lab animal world, as when countless products such as hair rinses, or shampoos, are tested in a rabbit's eye, sometimes causing acute pain and blindness.

"One of my primary roles," Fox says, "is to raise consciousness, to get people to see animals as animals and treat them so. Sometimes so little can make such a difference. The self-mutilating monkey may not want out of its cage as much as it wants companionship. Put mirrors before a monkey's cage and you have improved its life. Give chickens perches. It has been proved that pigs get along best with no more than 29 in a pen. Let confinement pigs get together—that's all they want. Put veal calves four to a pen and let them move around. And, my God, it seems that laying-hen cages could be big enough for all the birds to stand up and even to have a perch, doesn't it?"

Considering the magnitude of the problem, the animal rights movement sometimes seems like a match in a hurricane—but little flames can grow large. One solution is new legislation to protect animals. Encouraging new laws are going on the books in Europe. Veal confinement, for example, was developed in Holland and France; now those countries are outlawing practices which are common in America.

But Fox has more faith in persuasion than in legislation. "In England," he points out, "the Ministry of Agriculture now has a permanent farm animal welfare advisory council which sets up minimal codes of practice, with government inspectors who have made all farmers aware of these codes. We need this in this country. It does not mean more government regulation but rather it means that the farmer and the company that contracts the farmers can abide by professional standards and have some pride in what they do."

At least 12 universities now offer animal rights courses, and activism on behalf of animals is on the rise. The signs of activism are scattered and small, like early straws in the wind. But ever larger numbers of people are involved. A recent poll indicated that eight million Americans are vegetarians—and, as Fox puts it, "37 million conscientious consumers are really concerned about what and who they eat, for health reasons and for ethical reasons."

Michael Fox knows the facts of life. He is aware of the difficulties of bringing about fundamental change. But he makes change seem the most practical of prospects when, after a discourse on the evils of factory farming, a young woman asks him, "What can I do for animal rights?" Fox unhesitatingly ticks off the opportunities. "Know who you eat," he says. "Find a local producer. Try to find somebody who's producing free-range eggs. Secondly, you might find a local hog farmer who keeps his pigs outdoors much or most of the time; and if you want to eat a pig, when you've met a pig, OK. But cut out veal, because here it's probably been raised under total confinement conditions, and cut back on eating all animal products, for your own health as well as a protest."

Fox introduces Tiny to young friend in park. Wolves are neither savage killers nor pets, he says, but like all animals should be appreciated for what they are.

The East Cameron 49-B compressor station gathers low-pressure natural gas from an ocean area of 1600 square miles for transmission to shore.

Compressor station
Major collection platform
Production platform
20-inch pipeline
Feeder pipeline
Pipeline to shore

Schematic diagram of the gas transmission network connected to East Cameron 49-B.

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East Cameron 49-B.

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Almost 20 miles off the Louisiana shore, this platform represents a $24 million Tenneco effort to keep more natural gas flowing.

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The station has the ability to gather low-pressure gas from an ocean area larger than Rhode Island and, with additional wells certain to be linked to its network, it is expected to be on the job for another 20 years.

This is only one of the efforts Tenneco is making to increase the nation's supply of natural gas. Already a leading producer of natural gas in the Gulf of Mexico, Tenneco has become even more deeply committed to the search for additional supplies there. In two of the last three Gulf lease sales, Tenneco won the most sought-after block.

The Company is also vigorously seeking new supplies in the Atlantic Frontier. Our first well in the Baltimore Canyon, off the New Jersey coast, discovered oil and natural gas. We also drilled the first tests off the Georgia-Florida coast and we plan to participate in future exploration elsewhere in the Atlantic.

On shore, we have purchased, within the past year alone, rights to explore more than one million undeveloped acres in Oklahoma, Kansas, Texas, Colorado, Utah, Wyoming, New Mexico and Canada. Tenneco also has a one-half interest in a shale oil recovery project in Colorado which is estimated to contain 1.2 billion barrels of recoverable oil.

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Tenneco

By Robert W. Bagley

Masterworks of China's Bronze Age begin a tour of the United States

These ceremonial vessels and symbols of power, created in the two millennia before Christ, became foundation of a great artistic tradition

During the next year and a half, five American museums will play host to one of the richest archaeological exhibitions ever assembled. Devoted to the arts of the Chinese Bronze Age, the exhibition is being lent by the People's Republic of China, and opens this month at New York's Metropolitan Museum (April 12-July 9). From New York it travels on to Chicago's Field Museum of Natural History (August 20-October 29), Fort Worth's Kimbell Art Museum (December 10-February 18, 1981), the Los Angeles County Museum of Art (April 1-June 10) and Boston's Museum of Fine Arts (July 22-September 30).

Like an earlier archaeological exhibition from the People's Republic, seen in the United States in 1974 and 1975 (SMITHSONIAN, September 1973, February 1975), the new show is made up almost exclusively of objects excavated over the past two decades. Unlike the earlier exhibition, however, which ranged over most of China's history, the new exhibition concentrates exclusively on the Bronze Age (corresponding roughly to the last 15 centuries B.C.). The 105 objects exhibited can thus present a comprehensive picture of their era, and a thorough survey of one of the world's great artistic traditions.

The contents of the exhibition may come as a surprise to Western museum-goers: all but a handful of the exhibits are bronze ceremonial vessels. Valued by connoisseurs as perhaps the most brilliant of Chinese artistic achievements, and ranked in China as one of the leading art forms, the bronze vessels at first encounter might seem mysterious and unapproachable. Accustomed as we are to our own Western categories of architecture, painting, sculpture and "minor arts," we are confronted here with an art that stubbornly refuses to be classified. Compounding the exotic character of the bronzes is their decoration: animal-like images constantly materialize within the patterns, yet there is less interest in real animals than in creatures of the imagination. For example, in creating a charming bronze elephant (p. 68)—which represents no small achievement in realistic sculpture—the Chinese artist was most deeply concerned with the patterns that decorate the elephant's surface. Irresistibly impressive, sometimes almost overpowering, the bronzes have a splendor that is mixed with strangeness. The special qualities of the art itself are not difficult to appreciate: they speak to the viewer immediately. But to understand how these objects dominated Chinese art for 1,500 years, it may help if we examine the role played by the bronze vessels in the Chinese cultural order.

The origins of the Bronze Age in China are only now being revealed by archaeology, and every year brings new finds that push the beginnings back to a still more remote antiquity. No single date can be supplied for the beginning of the Bronze Age, nor for the end either: bronze fell from use slowly, and continued to serve some purposes long after it was ob-

Superb technique of casting body in one piece marks this late Shang wine vessel. When found, it held 320 jades, probably sacrificial offerings to some deity.

Photographs by Seth Joel

Robert W. Bagley, a specialist in Chinese Bronze Age art and archaeology, helped organize the exhibition and is one of the authors of the catalog.

Fine spiral background characterizes surface detail of early bronzes, as on this four-legged vessel

solete for others. One arbitrary but handy date that might be chosen to end the Bronze Age is the year 221 B.C.: the ruler of the principality of Qin (pronounced "chin"), having engulfed a series of rival states, united all of China under a single rule. Our name for China derives from the name of his state.

The founding of the Qin dynasty saw momentous changes in Chinese society. Weights and measures were standardized throughout the country, as were the writing system and the legal code. No less typical of the First Emperor's far-reaching projects was the completion of the Great Wall, made by linking together separate defensive walls built by the independent states of earlier centuries.

Oldest object in exhibition, a 10 1/8-inch pitcher, dates from first half of second millennium B.C.

The vast labors involved in projects on the scale of the Great Wall exhausted the resources of a land then just emerging from centuries of warfare, and the Qin rule collapsed only a few years after the death of the First Emperor. His empire thus lasted barely 15 years. Its importance in history is out of all proportion to its length. The Han dynasty, immediate heir to the reforms of Qin, ruled for four centuries.

A revealing stone relief dating from the Han dynasty depicts an event in the reign of the First Emperor of Qin which indicates the profound symbolic significance of bronze ceremonial vessels in the political mythology of the time. In it the Emperor is attempting with rope to recover a famous set of bronze tripod vessels from the Huang He (Yellow River). It was believed that possession of the Nine Tripods, which had been handed down from dynasty to dynasty and lost in the river before the Qin came to power, meant that a dynasty enjoyed the protection of heaven. In fact, the tripods were both the symbol and proof of a dynasty's right to rule.

The Han artist was obviously no admirer of the Emperor of Qin, because the relief shows him failing in his task through the intervention of a dragon that snaps the rope hauling up a tripod. Thus did heaven defeat the Qin Emperor's hopes of an imperishable Qin dynastic house.

dating from 13th century B.C., found in a royal Shang tomb in 1976. Animal-like face is common motif.

The Qin Emperor's immense achievements, his dynastic ambitions, and his megalomania left their mark on history, however. When he died in 210 B.C. he was buried in a fashion that was well suited to his titanic character. Recent excavations at his tomb complex have yielded one of the most astonishing discoveries in the whole history of archaeology, for the First Emperor went into the grave escorted by an army of men, horses and chariots, the warriors and horses modeled larger than life-size in clay (SMITHSONIAN, November 1979). The spectacle of this army of more than 7,000 figures, their dress and armor carefully differentiated, drawn up in battle formation, is awesome.

The exhibition that opens this month in New York will include a selection of eight of these clay figures from the First Emperor's tomb. The major part of the exhibition, however, is devoted to the bronze vessels such as those the First Emperor was so eager to recover from the Huang He. For a millennium and a half prior to the Qin Emperor's reign—for the entire Chinese Bronze Age—these vessels were central to religion and ritual. During that time they were the principal art form, and today they are the characteristic artifact of early Chinese civilization. Their role as symbols of the royal authority was derived from their central place in the state cult of the first Bronze Age dynasty, the Shang.

The Shang kings, who ruled during the latter half of the second millennium B.C., engaged in an unremitting cycle of periodic sacrifices to powerful spirits. The most potent deities were the spirits of the king's own ancestors. Each of these required a variety of different sacrifices on different days of the year; in addition, other offerings might be demanded at royal funerals or on special occasions, as determined by the royal diviners, so that a good deal of calendrical bookkeeping must have been necessary merely to keep track of what sacrifices were due, and to whom, on any given day. The sacrifices in question were customary offerings of food, wine, livestock—and sometimes of human victims as well.

The bronze vessels seen in the exhibition must have contained the food and wine offerings, and were probably arrayed impressively on the altar of the ancestral temple. The bronzes must also have had a conspicuous place in funeral ceremonies, and they were left in the tombs as the most important of the tomb furnishings, probably filled with offerings of food. The majority of the bronzes that have survived to the present day come from tombs.

It was the Shang king's special relationship with the unseen powers—they were, after all, the spirits of his own ancestors—that gave him the right to rule and made his dynasty legitimate. The periodic sacrifices were the means by which this relationship was kept in good order. Only by meticulously carrying out the established round of sacrifices could the king maintain the proper relations between the spirit realm and the visible world, and preserve his own power and author-

Shang ax, 14 inches across, was buried with remains of 48 persons whose demise it probably caused.

Inscription on inside of Zhou vessel pinpoints its date to fifth year of reign of the second king.

Vase from Central China has unusual decoration of silkworms on mulberry leaves; sixth century B.C.

ity. Given the prominent role of the bronze vessels in all these sacrifices, it is easy to understand how the mythology of a later day could turn them into the very source of dynastic legitimacy.

Wine vessels seem to have had a special place in ritual from the earliest years of the Shang dynasty and even before. The first object in the exhibition is one of the very earliest bronze vessels yet known from China, dating from the first half of the second millennium B.C., and it is a small pitcher meant for offerings of wine (p. 64). Graceful, almost affected in its exaggeratedly slender proportions, it is nevertheless outspokenly primitive in its simplicity by comparison with its descendants.

The late Shang dynasty wine container (p. 62), in essence only a bucket with handle and lid, is so encrusted with its rich decoration of bird designs, and so dramatized by the heavy vertical flanges that project from its sides, that it leaves functional considerations behind and begins to approach the force and monumentality of a work of architecture. It is characteristic of such objects that the flawlessly cast ornament is firmly subordinated to the "architectural" quality of the shape—the motifs are fitted neatly into compartments formed by the flanges that divide up the surface. Until very late in the Bronze Age, the metalworkers who produced these tours de force relied on their ability to work decoration into the clay casting mold and then to cast it with perfect accuracy. Unlike their Western counterparts, the Chinese craftsmen saw no need to hammer or engrave decoration into the cold surface of the cast bronze. The outcome of this special kind of workmanship is a close harmony between the shape of the vessel and the decoration that fills—or grows out of—its regularly compartmented surfaces.

An imaginary menagerie

The elaborate decoration that grew up in the bronze foundries seems to make no allusion to the pantheon of spirits to whose service the bronzes were consecrated. The designs are filled with images that evoke the animal world but, unlike the griffins and chimeras of Western mythology, the creatures found on the bronzes are seldom mere composites of real animals. Instead they are for the most part purely imaginary beasts, created in sketchy form and then elaborated and refined by the imaginations of generations of bronze casters.

The most common of these zoomorphic inventions, called a *taotie,* is seen everywhere on the early bronzes, and represented here by the decoration covering all four sides of a four-legged vessel excavated in 1976 from a Shang royal tomb (pp. 64-5). The exhibition includes 13 objects from this tomb, the only royal burial

of the Shang period ever found intact and undisturbed. It belonged to a consort of one of the Shang kings, and contained an extraordinary wealth of funerary offerings, including a staggering total of 200 bronze vessels. Named Fu Hao, the occupant of the tomb may have been the mother of the heir to the throne; in any case she was an exceptionally powerful figure at court. There are records of state sacrifices at which she presided in the king's place; other records show her leading military expeditions against the many hostile tribes that surrounded the Shang territories. In addition to the bronzes, Fu Hao's tomb contained a rare group of small jade carvings; a few of them are somewhat crude and unconventional in style and may well have been acquired by the lady general during her campaigns among some of the less civilized of her neighbors.

Props of the feudal hierarchy

The king and his immediate family were not the only users of the bronze vessels. Lesser nobles offered sacrifice to their own ancestors, and the vessels employed in these ceremonies were the treasured possessions of every aristocratic family. At the beginning of the next dynasty, the Zhou, around 1000 B.C., we find vessels cast with lengthy inscriptions naming their owners and describing the circumstances of casting.

The vessel and its inscription often commemorate a benefaction conferred by the Zhou king on the vessel's owner. If the owner is some vassal of the king, the king may commend his loyalty, acknowledge his merit and reward him with money or other gifts. The retainer proudly commemorates the event by casting an inscribed bronze to be set like a trophy on the altar of his family temple, there to remind both ancestral spirits and living descendants of his merit. The bronzes thus begin to shift from a genuinely religious function to become props of the feudal hierarchy. They assume an important political function in affirming the bond between lord and vassal. Reference in the inscriptions to the role of the bronze in ancestral sacrifices seems more and more perfunctory as time goes on. The inscriptions show more concern for advertising the worthy deeds of the owner to posterity.

The exhibition includes two remarkable Zhou vessels, which take on a unique importance because of their inscriptions. One of the two, found in 1976, specifically mentions the overthrow of the Shang dynasty by the first king of Zhou; the nobleman who commissioned the vessel was honored by the Zhou king for his services on that momentous occasion, and the inscription is dated just eight days after the conquest. The second inscription is dated to the fifth year of the next king, and it alludes to the building of a

Inlaid with copper and malachite, this vessel was found in 1957 and dates from the fourth century B.C.

Fantastic animals festoon enormous vessel, which weighs 141 pounds; about sixth century B.C.

Although it is only nine inches in height, this highly elaborated young elephant with dragonlike trunk suggests all of the power of the living animal. Elephants are rare in Chinese bronzes.

new capital city for the better administration of the conquered territories. This inscription is a historical document of real value, for although the founding of the new capital is an event recorded in traditional historical texts, there is no agreement in the texts as to the date. Inside this impressive vase, the bottom is covered by the 119-character inscription, while violently hooked, projecting flanges and bold high-relief decoration mark the exterior (p. 66 top).

In the course of the Zhou dynasty, which lasted—in name though not in power—for eight centuries, the function of the bronzes continued to grow more political and more purely secular. In the Eastern Zhou period (770-256 B.C.), when the authority of the Zhou court had collapsed, vessels might be cast to solemnize treaties between rival feudal lords. Special sets of vessels were cast by princes who sought thereby to usurp royal prerogatives and to establish their own claims to authority; sometimes these vessels are state monuments in themselves, as in the case of the enormous and compelling wine vessel shown on p. 67. A bronze might form part of a princess' dowry, commemorating an alliance by intermarriage between the royal houses of two states.

The Eastern Zhou period saw the spread of the bronze art to the remotest corners of China, as the courts of petty princes and local lords began to copy the luxurious institutions of the metropolitan north. The spread to outlying regions of the bronze vessels, and some element of ritual they served, is reflected by many distinctive examples in the exhibition. One of the most curious is a small vase from the Chang Jiang (Yangtze River) region with an unparalleled decoration showing silkworms feeding on mulberry leaves. In time, distinctive local inventions of this sort began to enrich the artistic vocabulary of metropolitan foundries. Some such mixing of traditions is required to account for the spectacular vessel (p. 67), which shows an old and familiar shape virtually transformed by its ornate appendages—dragons climbing up the sides, a crane with outspread wings amid the petal shapes fringing the top, and a pair of feline dragons at the bottom carrying the vessel on their backs.

The mixing of artistic traditions was by no means

Unparalleled in Chinese art, this animal sculpture, about 17 inches high, its function unknown, is from southwestern China. The sculpture belongs to Dian kingdom, dated third to second century B.C.

confined within the boundaries of China proper. Eastern Zhou was a time when contact with other peoples, especially the nomads of Inner Asia, had a vitalizing influence on the native tradition, contributing elements of the lively nomadic "Animal Style" art, and perhaps also the new decorative techniques of gold and silver inlay. One of the most extraordinary instances of foreign influence can be seen in a ritual object—its precise function unknown—that comes from southwestern China and represents a tiger attacking a bull. Here there seems indeed little trace of the native Chinese tradition: the motif of animal combat is typical of the Animal Style, while the naturalistic modeling of the animals, perhaps pointing to contacts farther to the south and west, is as puzzling as it is impressive. The sculptural rendering of animal and human forms is a comparatively minor theme in the art of the early Bronze Age, though one that was to assume a greater importance with the passage of time. Even very late in the Eastern Zhou period the figure of a rhinoceros (pp. 70-71) has only begun to break free from the symmetry and rigidity of the bronze elephant made a thousand years earlier, and the maker of the rhinoceros was still concerned above all else with his sumptuous surface ornament (originally it was inlaid with gold). The absence of surface ornament on the bull and the tiger is no less startling than the realism of its modeling.

In the latter part of the Zhou period, even the political function of the bronze art receded from view. The mythical vessels that the First Emperor of Qin sought to recover from the Huang He had a significance, derived from legend, that was missing entirely from the bronzes made and used in his day. During the last few centuries of the Bronze Age, the bronzes became more and more the prized possessions of an ostentatious and luxury-loving upper class. An art form that was at first intensely religious, severe and imposing in character, was eventually secularized in design as well as in function, its archaic severity giving way to sensuous patterns in rich materials. Inlays of gold, silver and semiprecious stones seem meant to appeal more to the living than to the dead.

The art forms of late Zhou, Qin and Han—bronzes

but also jades, lacquers and silks—reflect a more cosmopolitan and worldly outlook than do the austere creations of the Shang casters. Nothing after all could show more attachment to the things of this world than the Qin Emperor's determination to enter his grave escorted by a whole army.

The quest for physical immortality, an obsession in this period, is no less worldly. Powdered jade was consumed by the living in the hope that it would confer immortality, and the jades laid in Han tombs were popularly supposed to preserve the flesh from corruption—a prosaic rationalization for the use, stretching back over millennia, of jade mortuary offerings. The inlaid bronze censer (see cover) was made to represent the craggy peaks and environing ocean of the fabled Isle of the Immortals, and it comes from the tomb of a Han prince who was laid to rest in a burial shroud made entirely of jade plaques stitched together with gold thread.

In this late period, just as in the early Bronze Age, we are dependent on the furnishings of tombs for the preservation of works of art. If the religious function of these objects was no longer uppermost, the change of purpose did not make them less suitable as funerary offerings. Their presence in tombs reveals on the part of their owners a desire to enjoy in the next world the same luxuries that enriched this life. Their fortunate preservation brings us in touch with an era of human history that has left few other tangible traces, and today these objects speak to us directly in the universal language of anonymous artistic genius.

The essence of the spirit of the beast is caught in rhinoceros, about 23 inches long, from the third century B.C. It was originally inlaid with gold.

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Harry Burnett

Einstein posed with look-alike marionette in Pasadena in 1931; many of his scientific predictions couldn't be checked with experimental techniques of the day.

Multiple image of the Earth in its orbit around the sun illustrates the idea of perihelion advance. Perihelion is the point in a planet's orbit that is

By James S. Trefil

Einstein's theory of general relativity is put to the test

Working at astonishing levels of accuracy, physicists prepare to challenge the concept on which our picture of the universe is based

No one who has seen his share of Westerns can fail to recognize the scene. The old gunslinger, grizzled and scarred from many battles, sits in the Deadwood Gulch Saloon. One by one, young cowboys converge on the town, each one eager to get the credit for beating the old lion to the draw.

A modern version of this story is taking place in physics today. If you substitute the shade of Albert Einstein, just past his hundredth anniversary, for the old gunslinger, the august reaches of the Institute for Advanced Studies in Princeton for the Deadwood Gulch Saloon, and a largish group of physicists for the young cowboys, you will be seeing the old drama being played out in a new setting over the next few years. At issue is a theory that has been around for more than 60 years, and the prize being sought is to go down in history as the man who proved that Albert Einstein was wrong.

To give you a clear picture of the situation, a little background is in order. Although we usually think of "physicists" as a pretty cohesive and uniform group of individuals, in fact there are two very distinct types.

closest to the sun. The perihelion keeps moving—in other words, the orbit itself is rotating around the sun, something like a Hula-Hoop. This advance is even more pronounced for the planet Mercury and is very close to the amount predicted by Einstein in his general theory of relativity, since widely accepted.

Theoretical physicists think up ways to explain data and make predictions about measurements not yet made; experimental physicists carry out experiments to find out what the world is really like. These two groups begin to diverge sometime in graduate school, and by the time they reach professional maturity they tend to regard each other across a gulf of—well, hostility is probably too strong a word. Let me just say that I have never known an experimentalist who didn't chortle with glee when one of his results shot down somebody's pet theory.

Back in 1915, Albert Einstein proposed one of the most profound and far-reaching theories ever devised by the mind of Man: general relativity. It gives us an entirely new way of looking at the world, but aside from a few things we'll discuss later, it made almost no predictions that could be checked with the experimental techniques of the day. Nevertheless, because the theory was "beautiful" and "elegant," theoretical physicists accepted it almost immediately. It *had* to be right. When one well-publicized measurement agreed with Einstein, it was pretty universally accepted.

Only in the last 10 to 15 years has our ability to do experiments caught up with general relativity, and that's why the gunslingers are converging on the Deadwood Gulch Saloon. For the first time, they feel they can take on Einstein himself in a fair fight.

This new development also affects theorists, of course. For 50 years, they could spin out new ideas and put together theories different from Einstein's, secure in the knowledge that no one could then prove they were wrong. Now these airy creations can be put to the test. Already a number of them have been contradicted by new data, and we can probably expect a few more quiet burials in the future. The real question is whether, after the burials are over, general relativity will be among the survivors.

In the final analysis, the general theory of relativity is about the force of gravity. Newton had considered gravitation a force; Einstein said no, it is instead a curvature of space associated with the presence of matter. The Earth stays in its orbit around the sun, for example, not because it is held by a "force," but because it is following the easiest path through the

Color photographs by Michael Freeman

In composite picture, the watch closer to Earth, subject to stronger gravity, runs slower as predicted by general relativity. Light is also affected.

geometry of space created by the sun. The general theory attempts to explain what we already know about gravity. So although the stature of Albert Einstein tends to overshadow other issues, the real purpose of the new generation of experiments is to find the explanation of gravity.

There are three measurements considered to be classical tests of general relativity. In historical order, these are the changes in the orbit of the planet Mercury, the bending of light as it passes the sun, and the loss of energy (but not speed) of light as it moves upward against gravity. The first of these has to do with the fact (well known to astronomers in the 19th century) that the orbit of Mercury doesn't repeat itself exactly. The point at which Mercury makes its closest approach to the sun, called the perihelion, lies a little farther along each time the planet comes around. Most of this shift (which astronomers call a perihelion advance) can be explained in terms of the gravitational pull of the other planets, but a small part of the advance has remained unexplained. Einstein pointed out in his 1915 paper that because Mercury is so close to the sun (and thus subject to an enormous gravitational pull), the effects of general relativity would be seen in its orbit, and that these effects precisely accounted for the last bit of perihelion advance. This was the first success of the theory.

A more dramatic confirmation came in 1919 when Arthur (later Sir Arthur) Eddington led an expedition to the island of Principe off West Africa to take photographs during a solar eclipse. According to the theory of general relativity, light from stars passing close to the sun on its way to us would be deflected by the sun's gravitational effect, so that stars would appear to be in different positions from where they really are. By comparing photographs of stars taken five months previously (when the stars were in the night sky far from the sun) with those taken during the eclipse, Eddington was able to show that the amount by which the stars apparently moved was consistent with Einstein's prediction. Coming soon after the theory was published, Eddington's result probably did more than anything else to bring acceptance to Einstein's ideas.

It wasn't until 1959, four years after Einstein's death, that scientists at Harvard University carried out the experimental tests of another prediction. According to the principle of general relativity, light climbing up in the Earth's gravity should lose energy, just as a ball thrown upward slows down. Because light always travels at the same speed, however, this loss of energy will be manifested in a shift in the color of the light

The author, a physicist at the University of Virginia, has written often for SMITHSONIAN *on the subatomic world, and more recently on the virtues of firewood.*

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This nearly perfect quartz sphere will be spun as it orbits the Earth in a satellite. The amount that it drifts will be one measure of relativity.

Here the same sphere is partly inserted into housing which provides electrical support to keep ball suspended and isolates it from outside influences.

toward red, the less energetic end of the spectrum. Thus, in a strong enough gravitational field, light would lose energy; an orange object on the ground would appear red to someone seeing it from the air.

The actual shift toward red is much smaller than this, however, and it took some very fancy modern instruments to detect it. But the result was just what Einstein had predicted.

On the basis of these experiments, it would appear that the general theory of relativity has been amply validated. And so it would be if it were not for one seemingly insignificant point. All the experiments we have described measure very small effects, and all of them were just barely feasible when they were first performed. Historically, accuracy has always been a problem. Let's take the bending of light as an example.

Eddington was forced to move his telescope and photographic equipment to a remote location. He had to take photographs during the eclipse when air temperatures were falling rapidly and his telescope was actually shrinking. Finally, he had to develop his photographs, a process which causes the emulsion to change dimensions slightly. The inherent difficulties in the experiment guaranteed that there would be a large uncertainty in his final answer. In fact, Eddington estimated that the true deflection of light could have been 15 percent more or less than he found.

Time for a change

For a theorist who wanted to enter the gravitation sweepstakes, new light-bending experiments held promise. But despite repeated attempts to improve the light-bending measurements, the accuracy at the beginning of the 1970s barely exceeded that first obtained by Eddington on his 1919 expedition. Clearly, a new approach was in order.

That new approach turned out to be the use of radio telescopes—devices unknown when the general theory was formulated. General relativity predicts that radio waves will be bent by precisely the same amount as light waves when they pass by the sun, so that there is no reason not to substitute radio for light in an Eddington-type experiment. The giant telescopes at the National Radio Astronomy Observatory (NRAO) in Green Bank, West Virginia, are capable of determining with pinpoint accuracy the location of radio sources in the sky. Some of these sources, called quasars, are hard to see with ordinary optical telescopes, but are very "bright" in the radio sky. One of them, bearing the rather dull title 0116 + 08, goes behind the edge of the sun every April 11. Its radio waves should be most deflected just before it disappears behind the sun and right after it reappears. Since the sun does not drown out radio waves the way it drowns

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out ordinary light, scientists do not have to wait for an eclipse to observe this event.

In 1974-75, following earlier work by Irwin Shapiro, Edward Fomalont and Richard Sramek at NRAO set about repeating the light-bending experiment using radio waves from a quasar. Einstein's prediction was verified, and the level of uncertainty in the experiment was pushed down to about one percent. This tightened the requirements for gravitational theories, and a good many pre-1975 favorites bit the dust.

This episode can be regarded as one of the opening shots in the modern experimental assault on the theory of relativity. The general idea is to use the enormous advances made in experimental technique since 1915 to refine the requirements that any new theory must meet. The reason why this sort of effort could not have been mounted before is that most of the effects predicted by general relativity are either too small to be measured at all, or—like the classical tests—are too difficult to measure with enough accuracy to be useful in eliminating competing theories. The main effects of relativity are to be seen on a cosmic scale—in the interactions of galaxies and clusters of galaxies. Experimenters were restricted to measuring effects on a large scale, in effect using the solar system as their laboratory. During the last decade, however, a new philosophy has emerged. Rather than look for large-scale effects in astronomical systems, the new breed of experimenter prefers to search for tiny effects in the laboratory.

One of the most complex of the new-generation experiments is being readied at the physics department of Stanford University by John Lipa, John T. Anderson, Blas Cabrera and other researchers under the direction of Professor Francis Everitt. The project is based on a calculation made by the late Leonard Schiff (also of Stanford), who pointed out that a gyroscope that was simultaneously spinning around its axis and moving in orbit around the Earth would experience an effect of general relativity not seen in any other observation: a slow circular drift in the plane of the orbit. This drift is known as a "precession," and is probably familiar to most readers in another context. If you spin an ordinary child's top, you sometimes see it tip to the side and move slowly around in a circle, even as the top is spinning rapidly around its axis. The slow circular motion of the axis is called the precession of the top. Depending on the top and how you spin it, it may take anywhere from one to 30 seconds for the axis to go through the full circle.

A gyroscope works on the same principle as the top, except that it is built to a higher level of precision and is less fun to watch. You can think of the Stanford gyroscope as an ordinary top built in the shape of a sphere, spun around its axis, and then put into orbit. Because of general relativity, there will be precession of this "top," but unlike the child's toy the Stanford gyroscope would take approximately 180,000 years to go through the full 360-degree precession. The problem, then, is to detect this very small motion in a spinning sphere in a satellite above the Earth.

Arrays of special prisms (above; opposite) were placed on moon by astronauts. Scientists bounce light off them to measure the distance to within about four inches. Unexpected increases in distance could mean gravity is weakening, an effect not predicted by Einstein, one that would call relativity into question.

The Stanford group had to produce a sphere so uniform and so perfectly machined that the precession due to relativity would not be masked by other precession due to nonuniformity in the gyroscope itself. Everitt delights in showing his audiences pictures of "the world's roundest object"—a quartz sphere the size of a Ping-Pong ball (p. 78) and so perfect that if it were scaled up to the size of the Earth, the highest mountain would be only three feet tall!

If present schedules hold, sometime in the mid-1980s NASA will launch a small satellite containing four such quartz spheres in an apparatus cooled to within a few degrees of absolute zero (−456 degrees F). Once in orbit, the spheres will be "spun up" by small jets of helium blown across their surfaces, and then allowed to coast freely in a near-perfect vacuum for the rest of the year. The use of the extremely low temperature allows exploitation of the special properties of some metals called superconductors: at near absolute zero degrees, superconductors can provide ideal magnetic shielding and a very accurate measurement of the direction of the spin-axis of the gyroscope. In this way, the presence (or absence) of the precession predicted by general relativity will be measured.

In general, there are two ways a theory can be tested. We can see if the things that the theory says should happen *do* happen, or we can see if things happen that the theory says shouldn't. The classic tests of general relativity we have described all deal with the first of these options, as do many of the new generation of experiments. The satellite experiment is an example of measuring something that relativity says ought to be there. But other new experimental programs explore the second option—they look for things that, according to Einstein, shouldn't be there. One approach of the second type is to look for changes in the force of gravity itself.

Although Einstein and Newton concur on little else, they agree that the force between any two objects depends on their respective masses and the distance between them, but not on the time when the force is being measured. This idea is usually stated in terms of something called G, Newton's constant of gravitation, which relates gravitational force to the masses of objects and the distances between them. For both Einstein and Newton, G has not changed during the lifetime of the universe.

Is gravity weakening?

On the other hand, a persistent undercurrent of scientific thought, beginning with speculations by British Nobel Laureate P.A.M. Dirac in the 1930s, proposes that G might be a "constant" that changes. It couldn't change much, of course, or we would have detected it long ago. But the universe is more than ten billion years old, so changes in gravity even as small as one-ten billionth part per year would produce sizable changes over cosmic time and still be too small to detect in the nearly 300 years since the discovery of the law of gravitation.

Many attempts to find changes in G have been made, so far without conclusive results. Looking at one experiment will give us some of the flavor of these searches. Since the Apollo program placed laser targets on the moon (p. 80), it has been possible to use laser-ranging techniques to measure the distance to the moon very accurately. It has been known for a long time that this distance is increasing slightly—about 1.5 inches per year. The conventional explanation for this fact has to do with the details of the tides and gravitational interaction between the moon and the Earth, and was worked out more than a century ago. The question being raised now is whether these conventional explanations can accommodate all of the increase, or whether there is some small unexplained residue which comes from other causes. Is there any evidence for a weakening in the force of gravity between the two bodies? At present the results are incon-

clusive and even contradictory, but we can expect some sort of resolution as the work progresses.

Laboratory experiments designed to measure tiny changes in G directly are also on the way. The one that I find most interesting is being put together at the University of Virginia by a group headed by Professor Rogers Ritter. In essence, the experiment is a souped-up version of the original determination of the force of gravity done by the English physicist Henry Cavendish in 1798. The heart of the experiment is a small dumbbell suspended between two tungsten spheres. The law of gravitation tells us the weights on the ends of the dumbbell are attracted toward the spheres, just as the moon is attracted toward the Earth. Measuring the force exerted by the spheres, then, gives us a way of measuring the force of gravity and G.

The experiment is designed to monitor gravitational attraction over time (three months or more) to see if it changes. Any disturbance during the three-month period can disrupt the reading. People slamming doors, trucks on the street outside, shifting of the building due to wind are unavoidable sources of interference. To get around this, the Virginia group plans to mount the entire apparatus on a turntable which rotates three times a minute. The turning of the table prevents the effects of external events from piling up on one side. Over a period of many months, the net effect of all of the door slammings will tend to average out. Only real effects will be left.

Rogers Ritter checks a test mass on turntable. If it slows faster than anticipated, then matter is being created and relativity theory is incomplete.

The magazine *Audio* (June 1978) has already reported on the accuracy of this very remarkable turntable. One measure of the performance of a rotating system is how long it takes to stop after the driving mechanism is disconnected. An ordinary turntable, for example, will usually come to a halt within a few minutes of the time you turn it off. Some preliminary experiments at Virginia, however, require an apparatus so free from friction that if the power had been turned off five billion years ago, when the Earth was created, the rotation would still be going on today!

Like the satellite experiment, the measurement of changes in the force of gravity is a project which will take many years to complete. My personal opinion is that when all the tests are done, general relativity will be found to have come through with flying colors, just as it has up to now. It's reasonable to ask, though, what would happen if it did not.

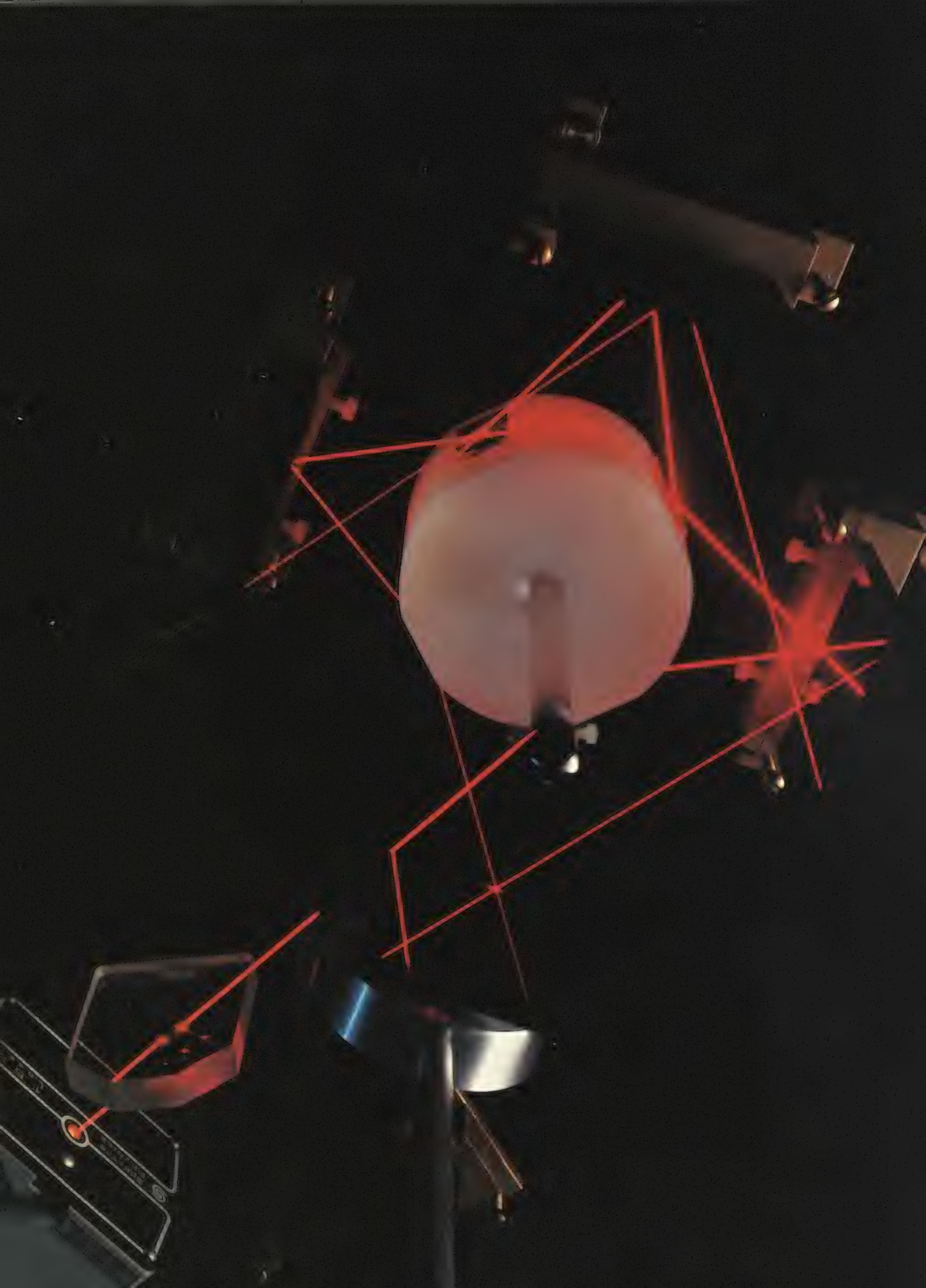
For most of our everyday lives, of course, it wouldn't matter. General relativity deals primarily with large-scale things in the universe, and their effects on the human scale are very small. That's why it's so hard to design experiments to verify the theory's predictions.

But if general relativity should be replaced, it could have drastic effects on some of the more philosophical questions about the universe. Black holes, for example, are predicted to exist by general relativity, but there are alternate theories of gravitation in which black holes do not exist. The "Big Bang" which started our universe has also been unraveled using Einstein's work, and if relativity were found to be incorrect, an entirely new picture of the creation might have to be developed.

And if tests of general relativity have effects on the beginning of the universe, they also have something to say about the end. The answer to whether the universe is "open" or "closed"—whether the present expansion will go on forever or will reverse at some future date and become a contraction—also depends on general relativity. New theories would undoubtedly change the way we perceive the fate of the universe.

So, at least on the scientific and philosophical level, the tests of general relativity, difficult as they are, are necessary. But so far, the old gunslinger is still on top.

Light beams from laser at upper right are timed to see how fast a test mass slows down. The method is accurate to one part in a hundred billion per year. Such accuracy was not possible in Einstein's time.



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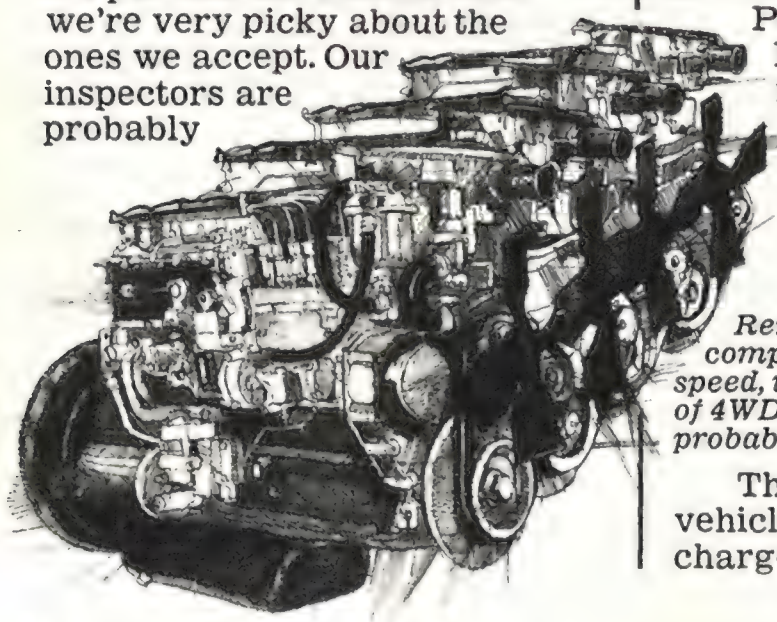

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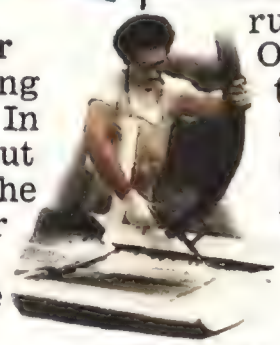

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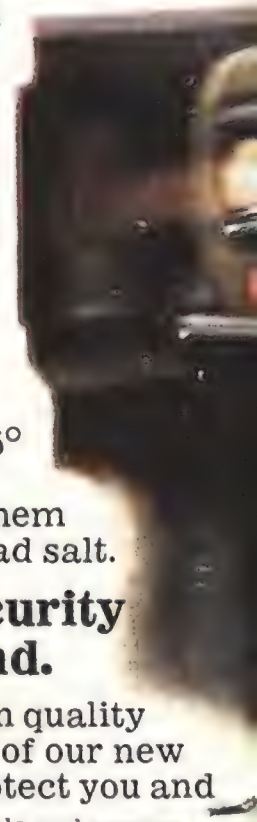

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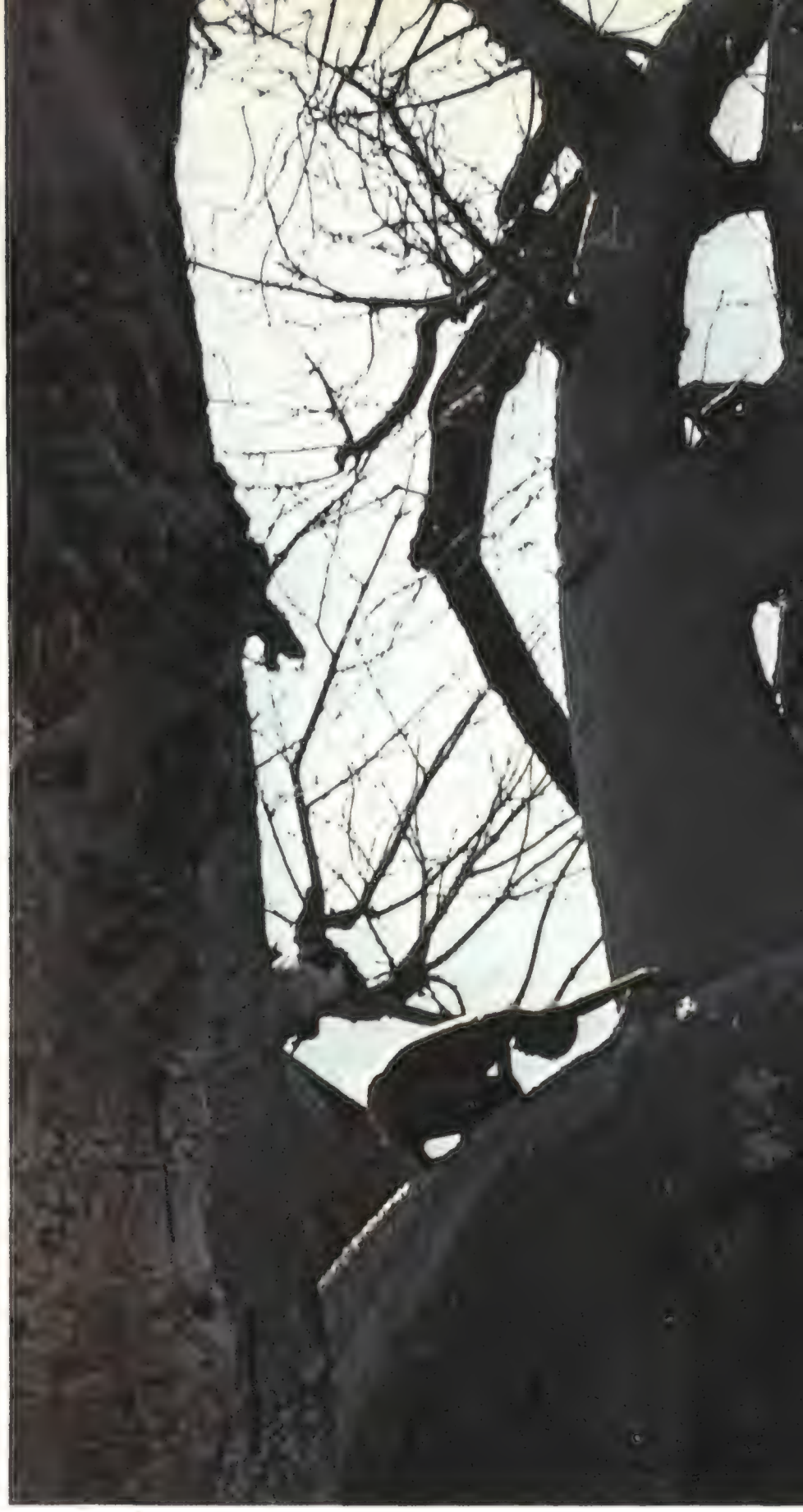
At the Marshalls' makeshift desert clinic in 1955, author comforts a burned Norna, named for Lorna Marshall (Bushmen can't or won't say "L").



Perched in a giant baobab tree, Bushman scans the veld for game. Baobabs provide the area's highest points for a hunter's lookout or boy's climbing fun.

By Elizabeth Marshall Thomas

American family's poignant sojourn with the Bushmen

Studying some of the last hunter-gatherers over a 30-year span, the Marshalls made close friends—and saw a culture disappear

In 1950 the author's father launched his family on an unusual project: the first prolonged investigation of the Kalahari Desert dwellers in South West Africa (now Namibia). In the years 1951-61, the Marshalls went from their Massachusetts home to the Kalahari eight times; the author's brother John, now a documentary film maker, continued his trips until 1978. By sustaining their friendship for some 30 years with the Kung Bushmen, they created, in publications and pictures, a unique record of an almost-vanished people. John Marshall's film, Nai, the Story of a Kung Woman, *tells about one of them and will be shown on public television's* Odyssey *series on Sunday, April 13.*

"There are no more Bushmen; lions have eaten them. Bushmen don't worship God, they worship Satan. The Bushman penis is very unusual; the Bushman vulva is very unusual. When the Bushmen make a kill, the whole tribe moves to the animal and they eat until they can't move. Next day they wake up and eat some more, until the animal is gone. Then they go off and hunt another. The Bushmen hide from people in the bush, and if you get too near them they shoot you with a poisoned arrow—so if you want to find them, set fire to the bush and they'll run out."

These are the stories we were told by white people in South West Africa when we first went there to find

Lorna (left), John and Laurence Marshall relax in light of their campfire at Gautscha in 1952.

the Bushmen. During the following years, when we returned many times to visit the Bushman friends we were to make—among those closest to us today are two men, Toma (p. 94) and Short Kwi (p. 90), and the woman Nai (p. 92)—we found that the single feature of their culture about which people had spoken with any accuracy was arrow poison.

My father, then recently retired as president of the Raytheon Company, which he had founded in 1922, wanted to make many trips to the Kalahari and spend at least a year at a time taking pictures, making maps, learning the languages, the culture and the hunting-gathering skills. He reasoned that land was finite but human populations were not. Eventually, ways would be found to irrigate the deserts and people with high technology would hardly bother to justify the taking of land from hunter-gatherers, who need a lot of room to survive. The Bushmen's old way of life, he feared, would very soon prove too extravagant of space for the crowded Earth. He felt a sense of urgency in making a record of how they got food, how they made fire, made clothes, made arrows, made string.

So much for our intentions. From the Bushmen's point of view, we were to learn, the reputation of white people was about as bad as a reputation could be —with good reason because it was based on actual observation. Precisely because the Bushmen were less powerful, they were acutely aware of the dangerous qualities of whites, whom they characterized as being easily angered, irrational, murderous. In colonial days, some white hunters regarded the Bushmen as subhuman and, we were told, hunted them.

But the Bushmen regarded whites as subhuman or nonhuman, too. When they needed a name for whites, they clumped them with predators and called them *zosi*, "animals without hooves." Pressure from white farmers on the Bushmen who lived at the edge of the Kalahari had been continuous since the 1940s. When the farmers lost some of their traditional source of labor—the Bantu people—to expanding industry and the mines, they turned to kidnapping the Bushmen and making them work the farms and herd cattle.

We could not find any anthropologists interested in joining our first expedition (30 years ago, mainstream anthropology was not especially concerned with lonely women out on the veld digging roots with a sharp stick). Fortunately, Dr. Leonard Carmichael, then Secretary of the Smithsonian Institution (artifacts that we brought back are in the Museum of Natural History Bushman diorama), assembled experts on South African cultures to talk with my father. And Dr. Charles Handley, now curator of mammals at the museum, was one of the scientists who did come along. (His inordinate interest in mice puzzled Short Kwi, with whom he discussed desert animals at great length.)

So, although none of us had ever taken more than a college course in introductory anthropology—and had never exposed so much as a foot of film—we went, intending to do our best: my father Laurence, 62; my mother Lorna, 53; my brother John, 19; and I, 20.

Language lessons in the bush

From the capital city of Windhoek we were guided by two Bushmen who worked on a white man's farm. Traveling in two trucks loaded with food, water, spare parts, gasoline and camera equipment, we went hundreds of miles through the trackless bush. Our guides taught us some of the Kung language. At night I could hear them imitating (I thought) my efforts and laughing at me. I didn't blame them because in Kung, as in any language, the slight alteration of a sound can change the meaning of a word; heaven knows what I may have said. To amuse themselves as they sat by their campfire, the guides used to imitate the sounds of English with perfect intonations—they spoke exactly like two Americans having a conversation.

After traveling more than a week toward the interior, we came to a cattle camp that belonged to a Bantu rancher. To tend his livestock he had hired several Bushmen. Visiting them was a man named Kwi, a hunter-gatherer who was accompanied by his family. They were about to rejoin others of their group at a place called Gautscha. We asked if we could accompany them and they said yes. They elected to ride on our trucks to our destination, a wide salt flat, dry except in the rainy season, with a deep water hole filled

The hunter Gao (with meat) became a good friend of the Marshalls. Here he shares section of kudu with neighboring band of Gautscha Bushmen. Animal's head, beside the grass shelter, right, also will be eaten.

with pure water in the rocks at its rim. We reached Gautscha, a beautiful grassy place dominated by a line of baobab trees, just before evening. From the upper branches of any baobab, I soon discovered, you could see two others—the tree ahead and the tree behind—like carrots of God.

We were so tired that we simply threw our blankets on the ground and fell asleep. But the Bushmen built shelters, frames of branches covered with wisps of grass, and in front of them built fires. They had nuts which they roasted and ate. During the night we were awakened by their voices. They were gesturing and speaking authoritatively, then were silent, so we went back to sleep. The next morning we learned they had been talking to a lioness. Hearing her walking behind their shelters, they had stood up and ordered her to move on. She had done so.

When we looked around our own camp we discovered that the lioness had visited us first, while we slept. She must have peered into our faces. Beside where our heads had lain we found her gigantic saucer-like tracks. Perhaps she had sniffed our hair and skin and breath. She certainly could have taken one of us had she wanted. We later learned that she lived near the water hole with her young. She probably just wanted to know, when she sniffed us and investigated the Bushmen, who else had come to camp.

Later that day, Kwi said he would go to search for the rest of his people and ask them to come live with us. That we should go to live with them was, we felt, out of the question because they were in the dry veld, using a watery root for their water supply. If we went to them, the roots might not sustain the extra people; we did not intend to compete for food or water.

We set up a temporary camp and sorted our notes and films from the jumble the lurching trucks had created. The next morning we suddenly noticed three Bushmen sitting nearby. One was Kwi, but the others we had not seen before: Toma and Gao (above), who were to become very special to us. They, like Kwi, were quite small—perhaps five-foot two or three or four—and brown skinned. They wore only leather loincloths and their hair, which is black and very fine, was its natural short length.

The moment we noticed them—they had come into camp so unobtrusively—we went to speak with them through our Bushman guide-interpreters. We told them our names and that we had come to learn about them—as much, at least, as they were willing to share with us. We would reciprocate, we said, if they were interested. We had a brief conversation, after which they agreed to let us live near them. They thought it would be a good idea if Westerners knew more about the Bushmen's life and they would help explain it to us by moving their families to the Gautscha water hole. They then stood up and walked off. The next day they returned with their families, built shelters and made fires. We started to meet them, including Nai, an impish eight-year-old. Our lifelong relationship with the Gautscha people had begun.

Toma was considered the leader among the Gautscha bands—although Bushmen have no chiefs or headmen—because he had an even temper, common sense, a genuine affection for everybody and a strong

Short Kwi did not like hospital-supplied artificial limb, so carved his own peg leg from a branch.

feeling for fairness. In addition, he was a highly competent hunter, a much-respected quality. The most effective hunter in the area, however, was Short Kwi, who took John on many hunts.

On one of them, Short Kwi shot a wildebeeste with a poisoned arrow. Deadly as the poison is, it takes two or three days to paralyze an animal of that size. After following the animal's tracks for three days, they found the wounded wildebeeste lying in a clearing, very sick but still able to defend itself with its horns. Short Kwi threw a spear into its side; it groaned, the spear vibrated, but the animal did not die. The question was: how to get the spear back. No one had another spear and without a killing thrust the wildebeeste might live for several days. Short Kwi solved the problem. While Toma distracted the animal from the front, Short Kwi ran at it from behind, leaped over its back, seized the spear and withdrew it. The animal swung its sharp horns upward, but too late—Short Kwi was gone. John, deeply impressed, asked him to repeat the procedure for the camera. Regretfully, the hunter refused: "The wildebeeste learned from the first time. Next time he would remember."

Lions, meat and purposeful men

John filmed a second wildebeeste hunt with Short Kwi and three other Bushmen. They came upon the dying animal lying in a clearing, surrounded by ten lions who were working up their courage to brave its horns. Short Kwi picked up a clump of earth and walked slowly but purposefully toward the lions. The other men did the same. "Great lions, brave lions," he said in an even tone, "this meat is our meat. Leave it alone." Rumbling, the lions backed off. The men advanced with care, throwing the clumps near the lions and speaking respectfully to them until the most distant lions lost their nerve and bolted, causing those nearest the hunters to lose their courage, too, and hurry after the others. The wildebeeste was left to the Bushmen, who killed it and cut it up to carry home.

When we returned to Gautscha the next year, Toma asked me why I was still unmarried. Bushmen say of themselves that they don't ask questions (even though they do), yet their questions are not always asked to elicit information but sometimes to imply distrust or criticism. Toma intended the latter. "If I were your father, I would have gotten you married a long time ago," he went on. I said I was too young, an answer Bushmen almost always give when asked why they don't do something or go somewhere or know something. Toma didn't like his own people's answer thrown back at him, especially since, in his opinion, it was untrue.

Because I was unmarried, the Bushmen considered

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me both woman and child. Some days I went gathering with the women, helping them dig roots and carry home heavy loads of other vegetables, firewood and little children too tired to walk. But part of my time I spent as a child, roaming the veld with three- to 16-year-olds, including Toma's oldest son, Tsamko, who was about eight. He showed me things that only a child would think to show: birds' nests in the baobab, a drowned hyena in a water hole, and the camp of a cheetah—a distant flash of gold which ran out of sight almost faster than our eyes could follow—in a beautiful clearing with an acacia forest all around and a water hole from which great plumed grass grew. The place was called Tsumkwe. And Tsamko showed me how to make a toy rifle and automobiles from vegetables and reeds. The rifle shot a stick out of its barrel and the cars had wheels that spun.

Girls played more organized games at camp and seldom wandered far afield unless they were helping their mothers with gathering. Nai, though only eight, was going through a difficult time in the life of a Bushman woman. She was soon to be married and, I thought, felt a lot of conflict about doing the work of an adult woman while still feeling like a child. She was moody and often sad. When John visited the Gautscha Bushmen in 1978 (by then they had been moved by the government into a compound built at the water hole at Tsumkwe, where I had first seen a cheetah), Nai recalled her childhood with nostalgic pleasure and poignancy. She also remembered her wedding day and how frightened she had been.

We were present at Nai's wedding in 1953 (she was then nine). The young couple's mothers built a shelter and a fire for them. In the evening, some boys—a wedding is a young person's thing—led Gunda, the bridegroom, to the shelter while some girls covered Nai with leather capes and carried her there. Nai remained in the hut, a silent bundle on the floor, but Gunda chatted softly with his child-guests until they all returned to their parents' fires. Young people do not have sexual relations until both have passed puberty, which, at the time of her wedding, Nai had not. In 1978, when Nai was 34 and had been married for 25 years, she told John that she hadn't liked Gunda at the beginning. John then filmed them sitting together, laughing at the difficulties of their early married years.

Short Kwi was less fortunate as his life unfolded. When we returned to Gautscha in 1955, we found that he had stepped on a puff adder, which bit him below the knee. His companions cut the bitten flesh and sucked the wound, but below the wound the leg shrank and turned black. He couldn't move it. We traveled for a day to where he was living, and when he unwound the rags that bound his leg we saw gangrene. We said we would take him to the hospital in Windhoek. Before we left, Short Kwi told us quietly that his leg had already fallen off. He wept, his wife wept, and the Gautscha people sat silent and stunned. Toma and another man took the leg out to the bush and buried it, as if it were a person.

Some months later, Short Kwi and his wife returned on a truck we sent for them. He was fitted with a

Impish child of the veld,
Nai hams for camera in 1957.

Today Nai lives in the crowded government compound at Tsumkwe.
Almost 30 years of her life are recorded on film by John Marshall.

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He praises the 450 SEL's suspension as "...independent in the purest sense of the word: not just because each wheel is allowed to trace the surface of the roadway independent of the others, but because all four wheels get their jobs done without subjecting you or your passengers to the sway and yaw that lead to motion sickness, or the hammering that wears you out."

Technical perfectionism permeates the 450 SEL. There are actually *seven* shock absorbers. And six separate brakes. Each door lock exceeds Federal standards for strength.

For 1980, the 450 SEL shows a *33.3 per cent* increase in fuel efficiency over 1979—without being drastically lightened, or downsized by so much as an inch. Its EPA estimate is 16 mpg., its highway estimate is 22 mpg. Compare this to other cars. Your mileage may differ, depending on speed, weather conditions and trip length. Your actual highway mileage and range will probably be less than the highway estimates.

The science of comfort

The 450 SEL is scientifically devised to *prevent* discomfort—in everything from the noise you hear to the vibrations you feel to the air you breathe.

You are cradled in seats designed to minimize fatigue, for example, not overpadded for a superficially "luxurious" feel. Two sensors and an adjustable rheostat help the climate-control system maintain an even temperature, at the level you select—12 months a year.

Retains 80% of value

Americans evidently respond to the 450 SEL's unique appeal: after three years, it has proven to retain 80 per cent of its original price.

Mercedes-Benz backs the 450 SEL, and every car it builds, with a dual commitment: to provide unparalleled engineering in its cars, and to provide unparalleled service—through the unstinting efforts of over 400 authorized Mercedes-Benz dealers across the United States.

Mozart flowing

Ultimately, the 450 SEL amounts to something more than the sum of its facts and figures. The Editor of *Car and Driver* put it into words.

"I sincerely wish," he wrote, "that everyone I love, anywhere in the world, could savor the experience of rushing down a country road in the middle of the night with Mozart flowing out of the speakers, and the three-pointed star, silhouetted against the headlights' path, leading the way. What a gift!"

Engineered like no other car in the world

©1980 Mercedes-Benz of N.A., Inc.

cumbersome prosthetic device that he could not manage. He discarded it and cut for himself a peg leg made from a straight branch, and a crutch. On a later trip my parents saw him again. He had heard that they were at Gautscha and walked 100 miles to see them. He visited a while, then walked 100 miles home.

In the 1970s Short Kwi told John: "I don't run anymore. My wife does the running now." He meant that his wife was seeing other men. Their marriage eroded and when last we heard, they were divorced.

During the early 1960s my father's predictions began to come true. Farmers demanded more land and the extermination of all animals that preyed on sheep; the government became concerned over political unrest among the Bantu people; and the mining companies were worried that their interests in the minerals of the Kalahari might be endangered. In response, the government of South West Africa drilled a well at Tsumkwe and collected the Bushmen of the area to live there. Where the wind once blew in the long grass, it now blows through a chain link fence, rustles the cornstalks and raises dust. Tuberculosis flourishes. The concentration of a large number of people in one place has depleted all the wild food. They have mainly cornmeal, insufficient as a diet. The Bushmen know this, but what can they do? They must plant what they have —which is corn. To supplement the diet, they leave the compound to hunt. Toma's son Tsamko is now a hunter. He has a horse which he sits like a Plains Indian, dragging a long-tailed spear. He said to John: "I am a gardener and the animals of the veld are my garden. I harvest them."

A church was built where nowadays an Afrikaaner preacher, wearing mirror sunglasses, tries unsuccessfully to transpose Christian doctrine into Bushman mythology. The story of Jesus and the woman at the well is seen by Bushmen as an effort by Him to trick the woman into climbing down into the water hole to have sexual relations. Their god thus tricks his own sisters-in-law. Jesus seems no better.

Some South Africans recognize that the people who lived by the oldest economy known to mankind are vanishing and will be gone in a generation; their way of life will no longer be known. When a local film company went to Tsumkwe to try to record remnants of the past, John filmed them making the Bushmen change their cotton clothing for skins again and act out a scene of a hunter coming home at the day's end. His child runs out to meet him: it is reminiscent of suburbia, where a group might be waiting at home for the breadwinner's predictable return. The hunter is instructed to pick up the child and put him down again right away, not carry him. But this is not a Bushman act. They carry children but do not raise them up momentarily.

Their age-old life, stable and successful beyond modern imagination, is being transformed into a Westernized middle-class myth, a television sit-com. But the Bushmen who act in it are glad to get the pay. Why should they care that their past is being misrepresented? It is only being misrepresented to aliens, strangers. Toma told John in 1978: "We were never many. We are disappearing. We are as few as fingers."

Toma remains a leader at Tsumkwe, but now wears sweaters in place of his Bushman's leather cape.

Boys at Tsumkwe sport play "helmets" of grass. Unlike their forebears' world, theirs is limited by hunger.

By John P. Wiley jr.

Racing a shadow of the moon across the skies

To gain vital minutes of observation time and learn more about the sun's corona, researchers chase an eclipse with a plane

A modified 707, bulging with electronic gear, sped east-northeast over the Indian Ocean in February, not to spy but to study a phenomenon that fascinated people long before history began: a total eclipse of the sun.

The plane raced along at 535 miles per hour, trying to stay in the moon's shadow, a patch of darkness at noon moving across the Earth at more than 1,300 miles per hour. The winner of the race was never in doubt, but by using the plane the scientists aboard extended observation time from four to seven minutes. Four of the five major experiments worked as planned, providing film magazines and computer reels full of new data on the solar corona, the sun's outer atmosphere where the solar wind originates.

The track of this eclipse started at sunrise in the South Atlantic and ended in China some three hours later at sunset there. Smithsonian folklorist Peter Isaac Seitel was on the ground in Kenya, gathering folklore and local accounts of the eclipse from villagers.

But a plane is a better vantage point for watching an eclipse. At 37,000 feet, the observer and instruments are above the densest part of the atmosphere and above almost any cloud cover, the bane of ground-based expeditions. Last summer, when the Air Force offered to make a plane available, a team of veteran eclipse watchers at Los Alamos Scientific Laboratory in New Mexico—along with colleagues from Kitt Peak National Observatory in Arizona and from Indiana University—went to work.

The plane, based at Kirtland Air Force Base in Albuquerque, was designed as an airborne laboratory. Complete with specially ground quartz windows on top, it was ideal for the eclipse mission. Telescopes, cameras, tracking systems and special devices to analyze coronal light, such as spectrophotometers, were installed, along with racks of electronics.

To get ready for the expedition, team members worked after hours for months, while the availability of both plane and money flip-flopped on and off. All for seven minutes' observing time.

They did it because they want to understand the sun, the fundamental source of life on Earth. And when the moon blocks out the glare of the solar disk the tenuous gases of the corona can be seen best. We know very little about the origins within the corona of the solar wind, the hydrogen and helium nuclei that stream out in all directions from the sun. Scientists suggest that the sun's activity, as seen in sunspots and the solar wind, affects our weather. Two cold spells in the Little Ice Age, one from 1400 to 1510 and the other from 1645 to 1710, occurred when solar activity was at a minimum. We know about the minimum because records for the period show few northern lights, which glow when the electrically charged particles of the solar wind come spiraling down to the Earth's magnetic poles. During the cold spells harbors froze, crops failed, colonists in Greenland died off.

But last February the sun was the most active it had been for two decades. The solar wind was blowing stronger than a North Atlantic gale, and the eclipse made it possible to see the corona, where it all begins.

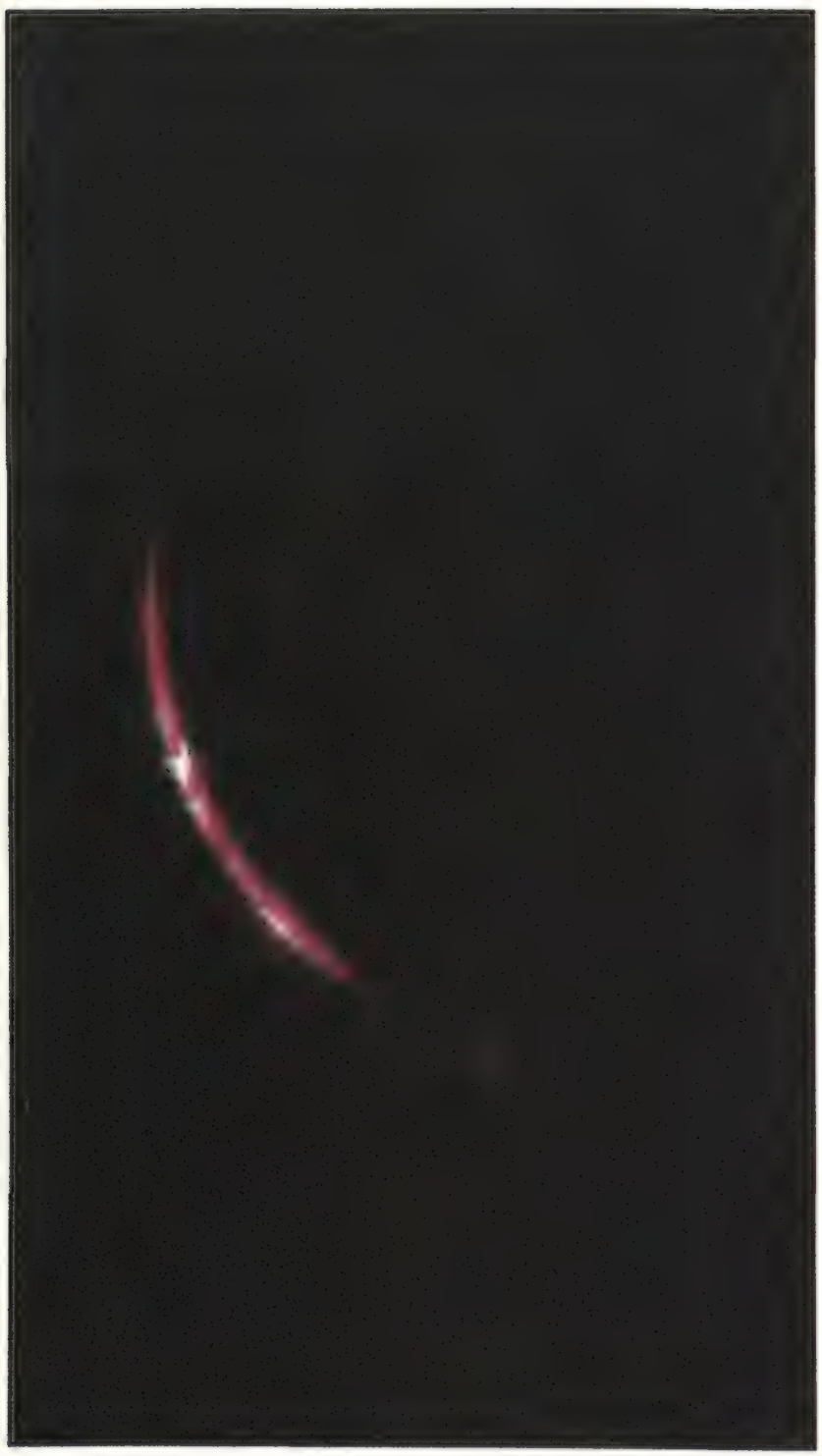
The surface of the sun is "only" 10,000 degrees F, while the corona is well over 100 times hotter. No one really knows why. The focus of the mission was to measure more accurately the temperatures, densities and motions inside the corona. (Actually, one experiment concerned the dust around the sun. By seeing at

Air Force crew, scientists gather for a "class picture" after eclipse flight over Indian Ocean.

Just as totality ends, coronal streamers extend many solar diameters away from sun itself. Bright light at "11 o'clock" is edge of sun seen through deep valley on moon; dark area results from filter on the camera.

Scientists chase a shadow

William Roach, test director, and Robert Jeffries, tracking controller, stand by at the command center.



The deep red of the solar photosphere is visible just before the moon covers the sun and totality begins.

what distance from the sun the dust vaporizes, something can be learned of its composition.)

After a practice flight February 1, the team was ready. In the snowy darkness of Albuquerque on February 9, under a crescent last-quarter moon, scientists, technicians and photographers fumbled into flying suits for the first day of predawn flightline breakfasts en route to Dayton, Madrid and, finally, Nairobi.

Grueling days resumed; practice in tracking the sun by day and bright stars by night, time running short and no postponement possible. We made a last practice flight on the 14th, gliding past Tanzania's Mt. Kilimanjaro but staying clear of the border (closed to Kenya). Over the ocean the plane took the racetrack course it would fly waiting for the shadow, like a yacht sailing away from and then back toward the starting line. Each time it was on the east-northeast leg everyone tracked—and prayed.

They were sure of one piece of equipment. The sun can hurt eyes up to totality, so Robert Brownlee used a piece of cardboard with a pinhole in it to project the sun's image and follow its disappearance. One of the team has used the same "lucky" cardboard since 1970.

Friday the 15th was another day for workaholics, interrupted only for a news conference with Kenyan reporters—and the final briefing. We were told the plane would be on course, on speed, on altitude two minutes before totality. No one would be allowed to walk around because someone might kick a wire loose in the semidarkness and ruin an experiment.

That night some old nightmares were remembered. Charles F. "Chick" Keller, the scientific coordinator, recalled a dream in which he had forgotten his camera and had to go back for it, only to see the plane leave without him.

The 16th, Eclipse Day, dawns overcast and smoggy. We're ten minutes late to the spot where we'll orbit, practice tracking and wait for the shadow.

By 10:15 the moon has begun to slide over the sun: the eclipse has started. Voices on the intercom are now all business:

10:44—"OK, crew. Starting inbound leg of first orbit."

10:52—"No more coffee. It's steaming up the windows."

10:56—The sun looks about one-third eclipsed. One large sunspot is visible through heavy filters.

11:20—"Any malfunctions?" "None."

11:30—We're running down the last back leg. On the surface, cruise ships packed with amateur astronomers are steaming in tight turns, apparently looking for clear sky between the cumulus.

11:35—"One minute to turn."

11:37—"Two minutes to roll out."

11:38—It is getting dark inside the plane.

11:38:24—"Tighten the turn."

11:38:47—"Starting roll out."

11:39:11—"Wings are level now."

11:39:50—Only a tiny sliver of the sun's left side remains. Teams use penlights to read dials.

11:42:53—"Two minutes to second contact" (the beginning of totality).

11:43:50—"One minute to second contact."

11:44—It is too dark to take notes. The sliver of light seems to disappear, then does, in a brilliant flare called the diamond ring.

This is it. The sun is a black disk in the sky, outlined by a bright ring of light that trails off into the pearly pale corona. The corona is not even: streamers extend out into space in a cross pattern; some parts look brighter than others. The sky is not completely black, but a dark green-violet. Outside the plane the sun is shining on the horizon: the clouds have a bright pink and orange sunrise cast.

(On the ground, Kenyan newspapers reported, animals and plants acted as though night were falling. Coucals, relatives of the cuckoos, sang their evening song, while ravens, little swifts and marabous flew in circular patterns as if preparing to roost. Antelope lay down to sleep and flowers closed their petals.)

The digital clocks everywhere in the plane seem to have sped up insanely, and suddenly a diamond ring flares up on the other side of the dark disk, a sliver of blinding light appears, and the eclipse is over.

We stay on course for another ten minutes so the scientists can calibrate their instruments one last time; then we turn and head back to Nairobi. A description of what we saw in the corona is radioed to the American Embassy in Nairobi for relay to colleagues waiting for totality to begin at Hyderabad, India. And a roll call reveals bad news: the spectrophotometer that was to provide data for coronal electron temperatures worked, but the computer recorded nothing.

It will be months before the scientists know what they have. But while they are analyzing their data, they will also be making plans—and looking for a plane—for the 1981 eclipse in Siberia and the 1983 eclipse in Indonesia.

A brilliant burst of light suddenly appears as totality ends. The edge of the sun is just beginning to shine between mountains on the limb of the moon. The other lights are only reflections in the optics.

© 1979 FP

A Country Path in May

Plates shown smaller than life size. Actual diameter: 9 inches.

IN FINE ENGLISH PORCELAIN...

The Country Year

BY PETER BARRETT

A collection of twelve beautiful porcelain plates, each portraying the charm and color of the countryside in a different month of the year.

Each plate bears an original work of art and is individually decorated with pure 24 karat gold.

To be issued in limited edition.

Offered by direct subscription only, with a further limit of just one collection per applicant.

Subscription application valid until April 30, 1980.

The beauty of a mountain stream in autumn, or a country meadow dappled with summer sun, possesses an enchantment that is universal. And it is the rare ability to capture this unique form of visual poetry — the beauty of the ever-changing countryside — that has established the English painter Peter Barrett as one of today's most gifted landscape artists.

And now, for the first time in his career, Peter Barrett has undertaken the task of creating a collection of important new works for issue in a form particularly prized by collectors: a series of twelve beautiful *porcelain plates* portraying the entire panorama of the countryside.

Each of these original works has been commissioned by Franklin Porcelain and created *exclusively* for 'The Country Year' porcelain plate collection. After it is completed, none of these plates will ever be issued again.

Each plate captures a different setting, a different month of the year

To encompass all the splendors of the countryside in its changing moods, each plate will depict a totally different setting . . . in a different month of the year.

The April plate, for example, conveys the loveliness of Spring from the perspective of a secluded bluebell bower . . . The spirit of May invites us to follow a quiet country lane . . . August brings us to a golden wheatfield, where swallows swoop low in search of food . . .

Wheatfields in August

The Colors of Autumn in October

No detail, no matter how small, escapes Peter Barrett's eye. Yet, over and above their sheer beauty, these new works accomplish something even *more* extraordinary. Because each plate actually seems to draw the viewer *into* the scene.

Challenging to create . . . satisfying to own

By letting elements of his art burst out of the center of the plate and flow to its very rim, Peter Barrett has given these works a unique sense of depth and dimension . . . a feeling of movement and vitality that brings *life* to every scene.

Furthermore, because of the precision of Barrett's art, and the fact that he has used some twenty-five separate colors in every work, this is a collection as challenging to create as it is satisfying to own. Indeed, more than two years has been devoted to its preparation.

To provide full scope for Peter Barrett's artistry and vision, each plate will measure a full nine inches in diameter. The entire collection will be crafted of fine English porcelain, whose traditional richness and vibrancy are exceptionally well suited to dramatizing the subtle colors of his art. And each scene will be framed within a decorative circular border of *pure 24 karat gold.*

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Here in the United States, the collection will be issued in a single edition, available *by direct subscription only* — and only from Franklin Porcelain. One plate will be issued every other month, and the issue price is just $55 for each plate and individual wall hanger.

Because of the international interest in Peter Barrett's art, a second edition will be made available overseas, with equally stringent limitations. In the tradition of the finest porcelain, the collection will be available only until the end of 1980, at which time the subscription rolls will be permanently closed. To enter *your* subscription, you need send no money now. But the application below must be mailed by April 30, 1980.

OUR PROMISE TO YOU: Franklin Porcelain takes pride in the excellence of its limited edition works of art. Therefore you may return any plate in this collection, for any reason, within 30 days after it is sent to you and receive a full refund or credit.

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Please enter my subscription for Peter Barrett's 'The Country Year' — consisting of twelve plates to be crafted for me in fine English porcelain.

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By Rosamond Bernier

The painter Miró, this month 87, is as lively as ever

Hirshhorn Museum mounts a retrospective celebrating the art of one of the century's most considerable—and durable—creators

Clear-eyed and active, working as energetically as always, Miró sits in his studio in Mallorca.

Joan Miró, well into his eighties, is one of the great survivors. He has survived as a human being: never has he been more alert, more spontaneous, more intense. He has survived as an upright citizen: in his middle seventies, he would put up with hardship and discomfort to manifest his solidarity with his fellow Catalans who were being persecuted by the Franco government. And he has survived as an artist: like Claude Monet, Henri Matisse, Pablo Picasso and Georges Braque, he seems to have met old age at the door and told it to come back another day.

It can be said of Miró, as it can be said of them, that in old age he has reinvented himself: as a painter, as a sculptor, as a printmaker, as a decorator on the heroic scale (ceramic wall murals, giant tapestries) and as the inspiration and costume designer of a troupe of Catalan strolling players called "La Claca."

In everything that he does, Miró is both poet and patriot. As a poet, he has a lifelong affinity with the Surrealist movement, which aspired to embrace the liberated unconscious, no matter where or in what language it expressed itself. As a patriot, his allegiance is to the region of Catalonia, and to Catalonia only. Though he carries a Spanish passport and is regarded by the new regime as a national hero, he thinks of Spain, outside Catalonia, as a foreign country—"as foreign to me as . . . Holland," he once told me.

In this respect, Miró is not so unusual. Beautiful Catalonia, four provinces of northeast Spain, with her ancient tradition of independence, has always inspired a unique loyalty. Catalonia was a trade center in Greek and Roman times. It was Catalans, the counts of Barcelona, who emerged in the ninth century as leaders in Charlemagne's Spanish March. It was Catalan art, Catalan literature, that created a cultural mecca in medieval times. Even after union with Aragon in 1137, Catalonia retained her own laws, cortés and language. Catalans never lost the sense of specialness, and the agitation for autonomy—for separation—never ceased. In the civil war, Catalonia sided with the Loyalists and suffered heavily, but the Catalan spirit was not subdued.

Miró grew up in and near Barcelona, which in the first quarter of the 20th century was marked by a cosmopolitanism, an intellectual curiosity and a craving for the new in art, music and literature. But it was not the place in which great art was being made. That place was Paris, and it was in the Paris of the 1920s that Miró established himself as an imaginative artist of the very first order. His success was not, initially, with collectors or dealers. It was with Pablo Picasso, 12 years his senior; with Paul Éluard, the foremost French lyric poet of the day; with two American expatriates, Alexander Calder and Ernest Hemingway; with Max Ernst and with Paul Klee. Which is to say,

Miró likes poetic titles; this is *Woman before an Eclipse with Her Hair Disheveled by the Wind,* 1967.

Pierre Matisse Gallery, New York

Miró was accepted by his peers. He was called a Surrealist—and rightly so—in that he allowed the unconscious full play and took no account whatever of the sedate, the humdrum and the orderly.

He could take a small canvas and pack it with 50 or more references to a specific Catalan scene; he could take a very large canvas and cover the greater part of it with a field of pure color, such as did not become common form in painting until many years later. No one knew what he would do next and we are still in the dark on that score—but as the years went by, Miró continued to look stronger and to change.

Thanks in the first place to the pioneering loyalty

The Farm, 1921-22, is Miró's loving evocation of the family homestead, which he still owns, in Montroig.

Ernest Hemingway, New York

of the art dealer Pierre Matisse, Henri's son, the United States has for many years been in the forefront of Miró collecting. Miró himself will often say that whereas until lately there was only one painting of his in a public collection in Paris—and that was a picture presented by himself—American collections are outstanding for the range and quality of their holdings.

For this and other reasons, he has followed with eager attention the preparations for his retrospective exhibition at the Hirshhorn Museum and Sculpture Garden in Washington, D.C., where it will be seen until June 8. It will then go to the Albright-Knox Art Gallery in Buffalo from June 27 to August 15 (SMITHSONIAN, December 1979). There have been other major exhibitions of Miró in this country, but this one is drawn entirely from American collections. When I went through the list with Miró at his home a few weeks ago, he greeted title after title with the idiosyncratic noises of approval—"Zac, zac, zac"—that he brings out when the occasion requires them.

With Miró in Barcelona

I have known Joan Miró for 26 years. In 1954, when I was preparing the first issue of *L'Oeil* magazine, I got the best possible introduction to Miró's world by exploring Barcelona, street by street, in his company. The most unlikely sights might spark his interest. It goes without saying that he loves the Romanesque frescoes in the Catalan Museum and the visionary architecture of his great compatriot Antonio Gaudí. But I soon found that the swoop of a bird overhead would stop him in his tracks just as surely as the great Gothic hall in which Ferdinand and Isabella received Christopher Columbus on his return from America. A broken telephone wire lying curled on the melting asphalt of the street at midday would interest him just as much as a Romanesque chapel.

He loved the uninhibited spirals of Art Nouveau grillwork, and when we went to the barrio Chino he fastened on a little bar that was decorated with stuffed animals garlanded with scarlet peppers. All created things were equal, in his eyes, and there is no telling, even today, what will come whisking out of his unconscious, the way a lizard whisks out of the rocks of the village of Montroig, where he grew up and where he still owns the family farm.

Miró stored up Montroig in his memory. He summed up the experience in what is now one of the best-loved paintings of our century: *The Farm,* which he painted in 1921-22 (opposite).

"I began that painting in Montroig," Miró told me, "in the days when I used to work out-of-doors—like Cézanne, in fact" (this was said with a smile). "Everything you see was actually there, even if I made changes or jumps in scale and rearranged things here and there. When a cactus interested me, for instance, I made it as big as a tree trunk, and when I wanted to show the inside of the chicken coop, I just left out the wire netting. It took me nine months, that painting—and I worked at it eight hours a day, like a farm laborer. I began it at Montroig, went on with it in Barcelona, and finished it in Paris. I even took grasses from Montroig to Paris in an envelope to make sure that I got it right. They dried up, so I had to go to the Bois de Boulogne and pick some more.

"No one liked the picture in Paris. I was very poor, but I would take it in a taxi to dealers, and then I'd have to take another taxi to get it home again. Paul Rosenberg said, 'Why don't you cut it into several pieces? People don't have room for such a big picture nowadays.' Then Ernest Hemingway bought it—for pennies, actually, but he really did like it very much. He lived not far from me in Paris, and I saw a lot of him. In those days I took good care of myself, physically, so as to be in top form for my work, and I used to go to the American Center and take boxing lessons. Hemingway went there too, and sometimes we got into the ring together. As he was very big and I was very small, it made people smile."

As a young Spaniard at the beginning of the 1920s, Miró had two great compatriots—men who had a decisive effect on the evolution of modern art. One of them was Juan Gris, cofounder of Cubism. The other, of course, was Pablo Picasso. Just before I saw Miró in the south of France last summer, I went to see the exhibition, at the Louvre in Paris, of paintings from Picasso's private collection. Two were by Miró—an early self-portrait and a *Spanish Dancer* of the same period. I asked Miró how this came about.

"My mother and Picasso's mother were friends in Barcelona," he said, "and when Picasso was in Barcelona in 1917 with Diaghilev's Ballets Russes, I knew, of course, that he was there. But he was older than I, and a famous man, and I was too shy to approach him. But I do remember one thing that impressed me very much. He was staying at a hotel with Olga Koklova, whom he married soon afterwards, and in the mornings he would get up and go to his mother's to shave. And one day his mother took me by the hand and said 'Come with me, come!' And there, in the bathroom, she showed me a drawing that he had made on the wall with soap and a shaving brush.

"When I went to Paris I asked his mother if I could take anything to Picasso for her, and she baked a big Spanish cake as a present for him. Naturally, I took it

Rosamond Bernier, founding editor of the French art magazine, L'Oeil, *a friend of Miró for 26 years, saw him at his home in Las Palmas, Mallorca, recently.*

Philadelphia Museum of Art, The A. E. Gallatin Collection

Isolation, anxiety and empty space are combined—also an escape ladder—in *Dog Barking at the Moon.*

over to him the first moment I could, and he immediately took an interest in me and tried to get people to see my work. As for the two paintings of mine which you saw in the Louvre, it's not true that, as people often say, Picasso bought them to encourage me. What happened was that Dalmau, my first dealer in Barcelona, got me a show in Paris in 1921. He was a good man, but not a good businessman, and he went broke in short order. He had hoped to do business with Picasso and gave him one of my pictures as a present. None of my paintings had been sold, and they were taken over by his creditors. Eventually, Pierre Loeb bought them. He owed money to Picasso, and Picasso took my *Spanish Dancer* by way of part payment."

Miró was a favorite on personal grounds with many of the Surrealist painters and poets in Paris. As far as his own work and evolution were concerned, he undoubtedly got more from the poets. It was thanks above all to Paul Éluard that he got a new idea of how language can be set free. He learned from Lautréamont, from Mallarmé, from Apollinaire and from Alfred Jarry. Eventually he became a master of the free-running French title that does not so much describe the painting as run parallel to it: *Femmes au bord du lac à la surface irisée par le passage d'un cygne,* for instance. To this day he still writes his painting titles in French.

But often the Surrealists' preoccupations were alien to him. He was, and is, a bastion of monogamy, whereas the Surrealists in general had piratical ideas in that domain. He was, and is, passionately attached to his homeland, whereas the very name of patriotism

Une étoile caresse le sein d'une négresse (A star caresses the breast of a black woman) of 1938

was abhorrent to many of the Surrealists. He had in the highest degree the liberated imagination which the Surrealists ranked above all other qualities, but he did not put it to work in the service of alienation.

For all his apparent benignity and sweet nature, Miró is a man eaten alive by his visions: a man who sees deep into human nature and is often appalled by what he sees. Terror and ferocity, anguish and foreboding are never absent from his work for long, and the plight of the individual in the 20th century has found few chroniclers as resourceful as he. When the world went awry in the 1930s, no one could find more compelling metaphors for what was wrong with it; but, in general, he was and remains that rarest of human beings, the unsickening seraph.

Even in difficult times, in 1937-38, that is to say, when the civil war in Spain prefigured an even more hideous conflict—he kept his equilibrium in relation to a subject that leads many a painter astray: his own self. One of the Mirós in the Hirshhorn Museum ex-

Pierre Matisse Gallery, New York

reflects Miró's involvement, from youth, with the modern French poets of Surrealism and symbolism.

Museum of Modern Art, New York, James Thrall Soby Bequest

Miró's hypnotically superb *Self-Portrait I,* 1937-38, is a study of anxiety as World War II approaches.

hibition is the self-portrait drawing that he made at well over life-size in 1937-38 (above). "Do you know what I did?" he said to me last year. "I took one of those magnifying mirrors that people use for shaving, and I made myself draw everything I saw in it, in the tiniest detail and on a very large scale." When the drawing was sold to the American collector James Thrall Soby, who left it not long ago to New York's Museum of Modern Art, Miró was sad to see it go. So he had it photographed and asked a friend to have it enlarged on squared paper to the exact size of the original. More than 20 years later, he took out that enlargement and began to work on it, superimposing a second self-portrait on top of the earlier one. Where the earlier one—for all its painstaking "realism"—had ended up as pure poetry, the reworking was a matter of heavy black lines, a pair of ghoulish eyes and a head that sprouted three tufts of hair. "A change of focus" is how he described it to me. Whether he meant to deflate the ecstatic quality of the earlier version, I cannot say; in any case, it will never leave his studio.

Not long after the outbreak of World War II, Miró began work on a series of small paintings that he called *Constellations* (one is in the Washington retrospective). He had taken a house for his wife and small daughter by the sea in Normandy, not far from his friend Georges Braque, and he had with him an album of particularly beautiful sheets of paper. He was subject, like everyone else in the area, to very stringent blackout regulations. "I had enjoyed looking out of the windows at night and seeing the sky and the stars and the moon, but now we weren't allowed to do that any more, so I painted the windows blue, to black them out. When it got dark I looked at those blank blue windows, and I got out a sheet of beautiful paper, and I took up my brushes and paints, and that was the beginning of the *Constellations.*"

The *Constellations* are universal favorites. He began with the accidental marks which resulted from his having wiped his brushes on the paper, and he drew

Pierre Matisse Gallery, New York

As a pure colorist, Miró ranks with the century's innovators: here, *Hair Pursued by Two Planets,* 1968.

fast and freely in charcoal, and then he began to work in gouache with a watchmaker's care and precision. While the world outside generated an ever greater atmosphere of foreboding, he made what might well have been a last roundup of all the ideas and all the images that had been dearest to him. They were multitudinous, those images, as if each painting were a refugee ship to be filled to the last inch of standing room with birds, beasts, insects, stars, emblematic men and women, the sky, the sun and the moon.

The *Constellations* were among the first works of European art to reach the United States after the war. They came to the Pierre Matisse Gallery in New York, by courtesy of a diplomatic pouch. Matisse has championed Miró's work in this country for some 40 years—most memorably in times when no one wanted it—and he remembers that the all-over, deemphasized configuration of these little paintings had a great impact upon the American painters who saw them.

Already in the 1920s, Miró had made paintings in which one or two small and idiosyncratic incidents were offset against areas of pure color. (One such in the Hirshhorn show is *Dog Barking at the Moon* of 1926; p. 106.) And then, in 1960, he returned to the idea of the huge and almost entirely uneventful field of color. Whereas in *Dog Barking at the Moon* he had kept in the symbolic ladder which stood for the possibility of escape, in the paintings called *Blue* he wanted to suggest infinity without the idea of escape.

Getting ready to paint

He talked at length about these paintings. "They took me a very long time, not to paint, but to *meditate.* It took an enormous effort, a great inner tension, to arrive at the spareness I wanted. The preliminary state was an intellectual one. It was like preparing for a religious rite, or the way Japanese archers get ready for a competition. They put themselves into a specific frame of mind. They breathe out, breathe in, breathe out. . . . That's how it was for me. I knew I was risking everything: one mistake, one moment of weakness, and the whole thing would have gone to pieces.

"I began by drawing in charcoal, very early in the morning. All the rest of the day I was preparing myself, and then I began to paint. It wasn't a matter of just laying on color, like a house painter. The movement of the brush, the movement of the wrist and the respiration of the hand all entered into it. The combat exhausted me."

It is now 20 years since that combat came to an end. It had a happy ending: Miró came through it unscathed. But the world has not come through the last 20 years unscathed. It has, on the contrary, become ever more violent, ever more fraught with menace and

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disquiet. Miró does not live apart from his times. "If my personages have become grotesque, it is because we are living in a monstrous epoch. I am more and more revolted by the world as it is," he said to me recently. He is still attentive to the line of flights of birds, the night music of insects and the often incongruous humor of nature. But the serene and weightless quality of the *Blue* paintings belongs to a vanished moment of apparent security in human affairs.

Like many another Grand Old Man, Miró is always being offered public commissions.

"Whether it's a large ceramic wall, or a monumental sculpture, or a big tapestry, what interests me is the direct contact with a mass audience. For example, we are working on a mural 30 feet high and 190 feet long, in ceramics. It's for the outside of a German museum. I don't remember the name of the town, but it's an industrial city, and from what people tell it's no fun to live there. What I want to do is to give the people who live sad lives in that sad city a shock of humanity, a shock of reassurance. I'd like to go there and see how it looks, just as I'd like to go to Washington to see my big tapestry in the new East Building of the National Gallery, and to Ve-SHEE-ta"—it took me a few seconds to translate this to *Wichita*. "I made a big mosaic for Ve-SHEE-ta, and I want to see what an effect it makes. It's on the outside of the university there, and from what I hear thousands of students go by it every day. What I want is for my work to become part of the consciousness of those young people, the men and women of tomorrow. One of them—who knows?—may become President of the United States and will have been touched by my mosaic. That's what makes it worthwhile.

"It's the young people who matter to me," said Miró, 87 this month, "not the old dodoes. I'm working for the year 2000, and the people of tomorrow."

Carnival of Harlequin, with the Miró ladder in place (above) and a fantastical universe inhabited by

Albright-Knox Art Gallery, Buffalo; Room of Contemporary Art Fund

happy, dazed and puzzled creatures, dancing to
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1 Talks with the NPA—a consumer coalition of over 100 inner-city neighborhood groups—led to a three-fold test program now underway in sections of Chicago, Cleveland, New York, and Philadelphia. We're encouraging agents there to help us write more homeowner's insurance. In two of these cities, we're offering a new "Home Value Policy" that makes inner-city insurance affordable. And we've put up a $225,000 grant to help reclaim rundown areas, backed by a commitment of up to $15 million in higher-risk urban development loans.

2 The hotline is just the most recent expression of our long-standing concern. If you want to know what information we have about you on file, just ask. If you tell us something's wrong, we'll reinvestigate and respond. As to Æconomaster, it not only offers lower premiums to start with, it can lower them even further when interest rates go up—a hedge against inflation.

3 Our studies so far show that about half of you think the traditional rating criteria are unfair. When told that new criteria could mean more money out of your pocket, however, only about a third still thought change was a good idea. In the real world, decisions often involve some tradeoff between costs and benefits. What we have here are two problems to solve at once.

4 Ætna recognizes we've helped fuel rising costs by selling health insurance that doesn't always give the consumer a reason to be concerned about them. Deductibles and co-insurance while effective aren't always popular. Unfortunately we too often give the customer what he wants without looking at the tradeoffs. We also haven't done enough to educate people to take better care of themselves or know when they're sick. Prevention is still cheaper than treatment.

5 It's now company policy to invite representatives from groups like the National Consumers' League up to Hartford. And Ætna now has 21 of its own consumer representatives who respond to your questions, suggestions, and complaints—somewhat unusual for an industry that's spent the last hundred years mostly listening to itself.

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Game guard Fakr Din stands his ground as an enraged elephant tries to turn back from drive to a reserve.

Photographs and text by Peter F. R. Jackson

Sri Lanka moves prized elephants out of harm's way

Trying to feed 14 million people in an area the size of West Virginia, this island country seeks a balance between farms and wildlife

At five o'clock the roar of the bulldozers died away, and the jungle took over: the coo-cooing of doves, the swish of wings as a flight of hornbills passed over. From afar came the sound of men shouting, moving closer.

My companion listened intently, then turned and said, "They're coming through right here."

The bushes stirred, the topmost branches swaying gently. Shouting grew louder; firecrackers exploded. Suddenly, the huge head of an elephant thrust from the bushes, trunk extended to scent danger. From beyond came more bangs and shouts. The elephant burst out, heading fast across the dirt track for another patch of jungle. Another elephant followed, then another.

Down the road a second group broke across to cover, among them a baby, scarcely two months old, shuffling along with its mother and the rest of the herd.

In less than a minute it was over, and from the dense jungle in the wake of the elephants a group of men in khaki emerged, sweating heavily.

"That was 24 across," my companion, Ranger A. B. Fernando, called to his men. "Keep them moving."

I was watching part of an effort to save Sri Lanka's

Sri Lanka saves its elephants

A remnant herd, including youngsters, is stampeded across a narrow dirt road on the long trek to a new

elephants as their jungle home disappears. It is neither a new effort nor a new problem. The cover story in the first issue of SMITHSONIAN, published ten years ago this month, described Sri Lanka's attempt to preserve its elephants. Since then, more and more jungle has fallen to chain saws and bulldozers as the land has been turned into fields of rice and sugarcane to feed the country's growing population. On my own visit I wanted to learn about the current status of the elephants—and their prospects for the future.

Ranger Fernando was responsible for moving the elephants we had just seen into a national park before they were trapped in an island of jungle in a sea of new agriculture. The Wildlife Conservation Department had learned only a year earlier that a jungle area southwest of the ancient city of Anuradhapura was to be opened up. By coordinating plans with the developers, a wild corridor was left through which the elephants could be driven. Then the corridor would be cleared, in hopes of cutting off the elephants' retreat. The herd I saw had been pushed for months and would shortly reach Wilpattu National Park, 100 miles north of Colombo. There they would find food and water, and maybe the peace denied them for so long.

But serious questions remained. Would these elephants stay in the park or would they try to return to their "home" territory? Wilpattu is large, but it is uncertain whether or not it has enough food and water for so many more elephants during the dry season.

Sri Lanka's Wildlife Conservation Department estimates that between 2,500 and 3,000 elephants live in the country. Only one-third are now in protected areas, which cover nearly ten percent of the island's 25,000 square miles. But there is considerable movement with the seasons as the herds seek food and water. Outside the protected areas, the elephants' future is threatened by vast development projects.

Sri Lanka is an example of the stark problems of saving wildlife in the face of an expanding population and limited land. The tear-shaped island, lying off the southern tip of India, is about the size of West Virginia. More than 14 million people live there now, compared with eight million in 1953.

For every political leader, food has been a vital issue. New cultivation means clearing the jungle, and thus the displacement of wildlife, especially the elephant.

At Sri Lanka's invitation, the Smithsonian Institution launched a three-year elephant study in 1967 supervised by John F. Eisenberg, now assistant director of the National Zoo in Washington. While Smithsonian and Sri Lanka ecologists were at work, U.N. experts were separately preparing a vast plan to develop the irrigation and hydropower potential of the Mahaweli Ganga, Sri Lanka's longest river. Eventually, nearly 40 percent of Sri Lanka will be affected. Much of the country's remaining lowland forests, where most elephants live, will be developed.

The Mahaweli Development Project was to be completed over a period of 30 years. Then in 1977 the United National Party came to power and the prime minister, J. R. Jayewardene (now president), pledged to complete an accelerated version in the 1980s.

There was consternation among wildlife conservationists. Robert Olivier, a World Wildlife Fund consultant and specialist on the Asian elephant, wrote: "The current and potential situation of Sri Lanka is

Peter Jackson of the World Wildlife Fund wrote on Operation Tiger in the August 1978 SMITHSONIAN.

home. Sri Lanka's wildlife conservation plans include temporary jungle corridors left for these moves.

Moments later the line of beaters emerges from the bush, pleased to have crossed another obstacle.

perhaps worse than anywhere else. . . . Nowhere else in Asia does there remain an elephant population permanently resident in lowlands."

Thus it was with some trepidation that I landed in Sri Lanka to see what was happening to the elephants. A few hours later I stood with Ranger Fernando watching the elephant drive.

First we had to find the herd. We stopped from time to time to get news of the elephants' whereabouts. Despite their size they can melt into the jungle, and even from close range it is hard to detect their presence. A farmer bathing in a roadside pond directed us to a patch of thick jungle and there we found the herd feeding quietly.

Fernando called his men together and drew up a plan, sketching with a stick in the red dust. During the afternoon the team moved into position. All around, machines roared and saws screamed as the work of clearing the jungle went on. With so much disturbance, the elephants would not move.

When work stopped, the push began and the 24 elephants stampeded across the first road. The light was already failing as we bumped cross-country in our Jeep and stationed ourselves on the next track. Once more the elephants rushed across in front of us.

One small group came onto the road, panicked and then swung back. And now the beaters faced their big test. It is one thing to shout and see four-ton elephants running away. It is quite another thing to have them charging at you, determined to break through your line. If one man broke, the elephants would get through and the whole operation would have to start again. But the line didn't break. Every man stood firm, shouting and letting off firecrackers. The elephants turned again and headed for the road.

They swung sharply right and came down the road toward us. There were ten or 12, packed closely together, with a tiny one in the middle. On they came. We yelled and waved our arms. Thirty yards, 20 yards, and then the herd swerved left and disappeared up a jungle track.

"Our mistake," laughed Fernando. "We parked just near the track they wanted to use. Well, that's got them where they can rest for a few days with enough food and water before we push them farther. With luck we shall get them to Wilpattu in another three weeks."

Wildlife reserves like Wilpattu have existed for many years in Sri Lanka, but the vast majority of elephants roamed outside them in jungles that are now being cleared. Clashes between Man and elephant were inevitable as displaced elephants turned to juicy sugarcane and rice. To protect their crops, settlers used rocks, flares, firecrackers and broadcast shot from muzzle-loading guns. Wounded elephants sometimes ran amok, attacking and killing people and destroying houses, crops and plantations. As a result, the Wildlife Department has been trying new ways—like the drive—to help elephants. But friction continues.

One day I went to the Wasgomuwa Strict Natural Reserve in the Mahaweli basin with a warden, Chandra Jayewardene. As we drove along an embankment I gazed upon rice paddies and scattered farmhouses.

"Where is the boundary?" I asked Chandra.

"Back there," he laughed. "You are now in the Was-

gomuwa Reserve. It was declared in 1940 and remained intact until a few years ago when squatters moved in."

The government is reclaiming the lost area in the face of an even bigger problem: development will eliminate most elephant habitat in the basin region.

As we walked through the rich jungle, Chandra told me that he estimates there are between 200 and 250 elephants in Wasgomuwa. After a while we came to an open area crossed by a well-worn track.

"That's one of the main poachers' tracks. We are keeping close watch on it now—two or three times a week my men come here, and sometimes camp," Chandra said.

We entered forest again. It was increasingly dense as we approached the Mahaweli river, which forms the eastern boundary of Wasgomuwa.

Suddenly Chandra raised his hand for silence and listened intently. Motioning me to follow, he and one of his men crept ahead and peered down the riverbank. A group of figures surrounded a smoking fire. One of them waved and shouted to Chandra.

He turned to me and said, "These are some of my trainee guards. They have caught illegal entrants."

When Chandra questioned the detainees, they said they had come to catch fish. Their baskets contained only fishing tackle, rice and cooking pots.

"These are hard cases to deal with," Chandra said. "One sympathizes with poor people who just want to fish. But in fact they may have guns hidden away around here. In any case it is illegal to enter the reserve without a permit. They will go before a magistrate who will try to find out more. Even if they are innocent they will spread word of what has happened to them and thus deter would-be poachers."

Given the pressures on them, can Sri Lanka's conservation areas accommodate the elephant population and other wildlife? Experience in Africa has shown that elephants penned in parks sometimes overburden the carrying capacity and destroy the trees and vegetation on which they live.

Lyn de Alwis, director of the Wildlife Conservation Department, thinks there is enough good habitat in the parks and reserves, reservoirs and connecting corridors, so there need not be a sharp drop in the elephant population, at least over the next ten years. De Alwis and his colleagues are hopeful, too, about minimizing conflict between elephants and people by creating buffer zones around reserves.

John Eisenberg recently summed up efforts this way: "An awareness of the elephant's utility and a place of the elephant in the folklore of the people have reserved for it a very special status. . . . It is nothing short of a miracle that the Asiatic elephant has survived as well as it has . . . given the pressures of human population and its very real needs."

A bull elephant bathes exuberantly in a reserve. Few males in the Sri Lanka subspecies have tusks, probably because extensive early poaching eliminated the elephants with large tusks from the gene pool.

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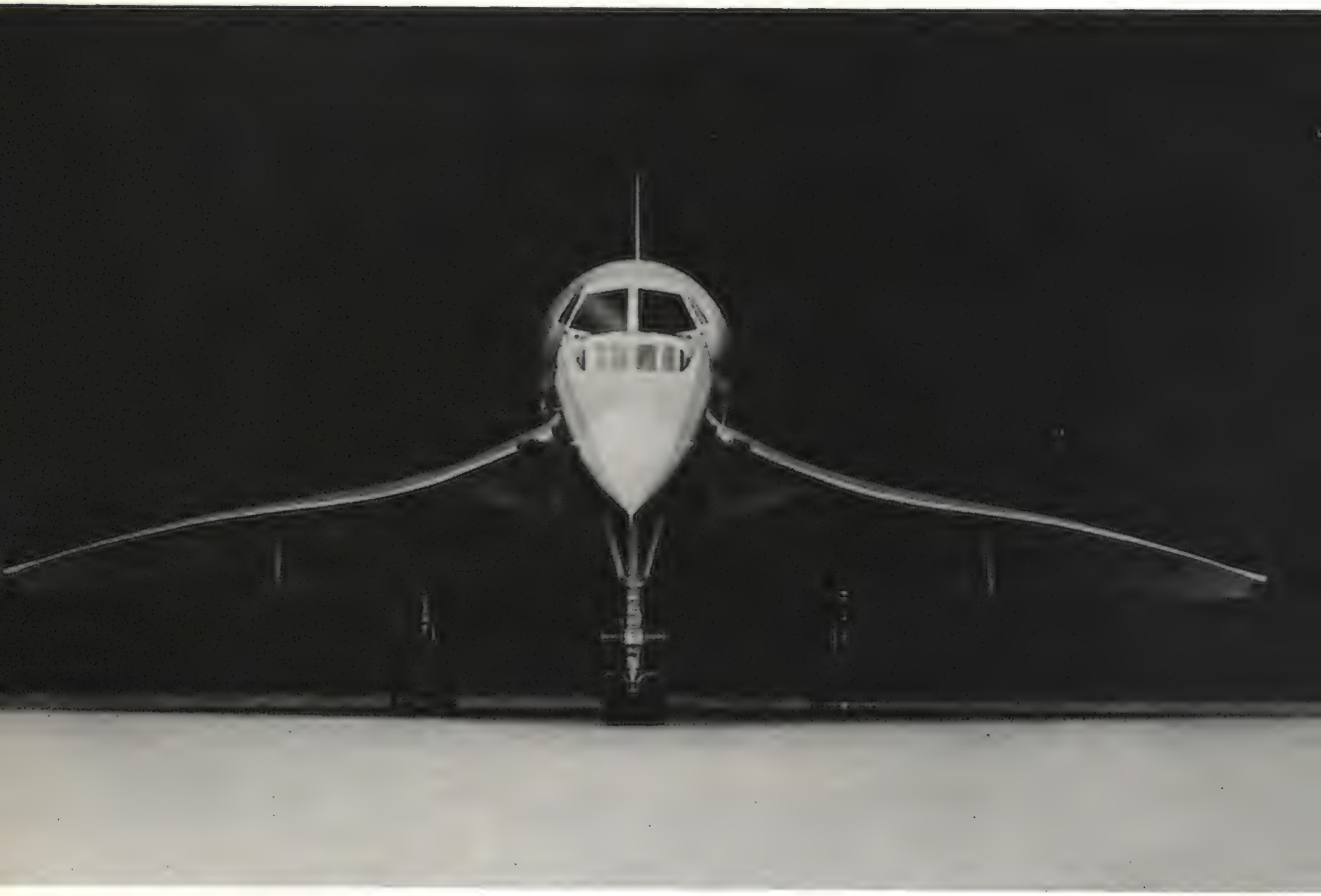

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'Nation's Attic' dusts off forgotten objects for show

Opening on April Fools' Day, exhibit of 125 remarkable whatchamacallits helps make museum into a fun house

There was a time when people called the Smithsonian Institution "the nation's attic." The term was never very popular with the Smithsonian staff, since it seemed to suggest a repository for cast-off, useless objects—and that hardly describes the Institution. But the nooks and crannies of the museums do contain some rather weird and unexpected artifacts, and recently staffers at the Museum of History and Technology began tossing around an idea: why not share with the public some of those attic-type objects? They're part of our heritage, and in their own way reflect America's past. The resulting exhibit, suitably opening on the first day of April, is called *Nation's Attic.*

Ben Lawless, Assistant Director of Exhibits, joined with Nadya Makovenyi, also of Exhibits, curators Robert Vogel and Carl Scheele, and rare-book keeper Silvio Bedini to produce this wonderfully irreverent exhibit. Lawless recalls that the group, sitting around a table brainstorming, contemplated items such as a silk purse a chemist had made from a sow's ear. (He did it by grinding up the latter and mixing it with other substances to form thread.) How could the museum organize 125 similarly outrageous objects?

"What about putting the purse in a category called Transmogrifications?" someone joked—and they did. Other categories evolved: Curiosities, Patents, Sacred Relics, Superlatives, Infinite Variations and Unidentified Objects.

The show includes such patriotic pieces as a bust of Ulysses S. Grant made from fine wire (above) and a "Clock of America," a magnificent piece of 19th-century kitsch that shows Presidents sedately rotating beneath an eagle-topped dome. Other objects (see examples on pp. 124-25) bespeak the spunky and sometimes wacky inventiveness associated with U.S. history—such as a "pocket" knife with 50 attachments, probably made as a "demonstration model."

The final category, Unidentified Objects, consists of several items that no one can figure out. Perhaps, says Makovenyi, some visitor to the exhibit may be able to identify them.

The objects aside, *Nation's Attic* reveals something basic about humankind: people just hate to chuck anything away. No matter how useless.

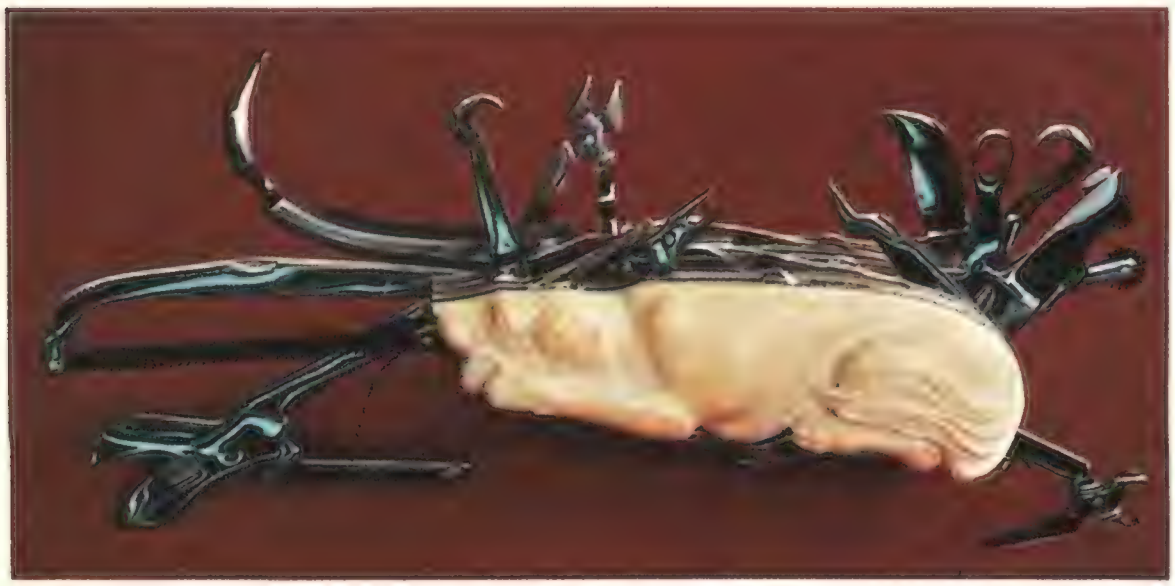
—Edwards Park

Photographs by Robert C. Lautman

Fine-wire bust of General Grant was crafted by Mrs. Juanna de la Vega of Lima, Peru, for display at 1876 Philadelphia Centennial Exposition.

Pneumatic eyeball massager invented in 1931 was operated by squeezing the rubber balls mounted on each side.

Designer of this 19th-century pill swallower considered it a boon for doctors with hesitant youngsters.

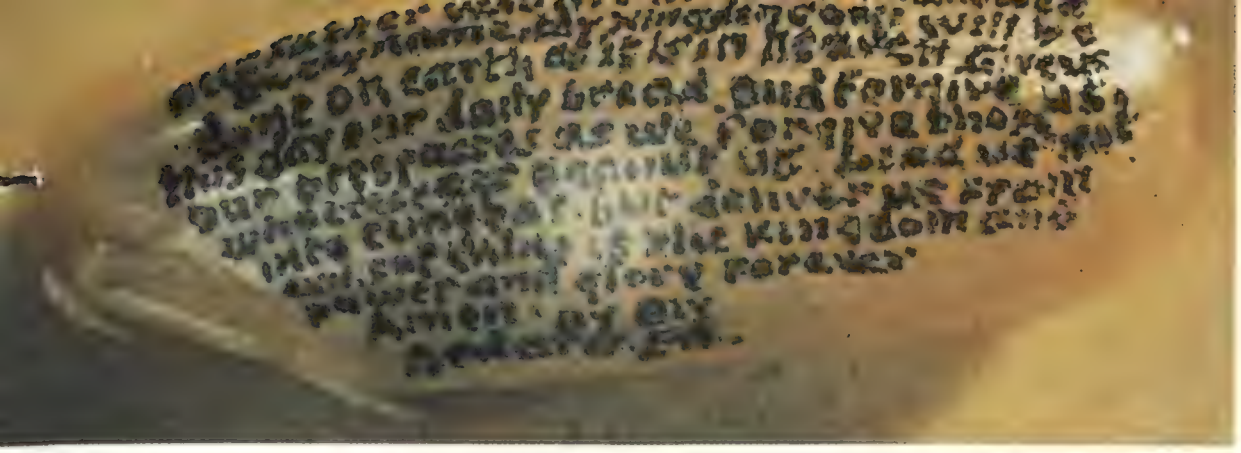


An elaborate "pocket" knife may have been made for trade exhibitions.

Antique cane handles used caricatures for fun and for a good grip.

Size 18 military shoes were custom-made for seven-foot two-inch Norwegian volunteer in Union Army.

This contraption was used in a New England town to parade tramps around, then escort them to the city limits.



The Lord's Prayer on a grain of rice
was written by micropantograph,
a machine for sending secret messages.

"Harmonica" and "chain"
pistols were two 19th-century
oddball repeating firearms.

Cobweb painting by a Mrs. Clopton
of Alabama represents a folk-art form
that originated in the Tyrolean Alps.

When alarm goes off, pillar zips
matches past sandpaper to light wick
of 1859 illuminated alarm clock.

One of world's largest
ocarinas, 28 inches long,
took 500 hours to make.

W. N. Brown patented his design
for this sewing machine with serpent,
but it was never commercially made.

Grotesque brass-cast oil lamp
probably perched on desk
to melt sealing wax for letters.

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COURVOISIER VSOP. THE BRANDY OF NAPOLEON

By Timothy Ferris

Hopeful prophet who speaks for human aspiration

Biologist Lewis Thomas speculates on the mysteries of nature, urging a more active sense of wonderment

Lewis Thomas exemplifies an arresting species of writer, the essayist who started late. Montaigne published his first book of essays at the age of 47. Thomas, who much admires Montaigne, outwaited his mentor; he was 60 when *The Lives of a Cell* appeared in 1974. By that time he had long been known in medical circles as a first-rate physician and research scientist, a challenging teacher and a skilled administrator—formerly dean of the medical schools of Yale and New York University, he has been president of New York's Memorial Sloan-Kettering Cancer Center since 1973.

Thomas' collections of essays (the second, *The Medusa and the Snail,* was published last year and also was on the best-seller lists for some time) have served to acquaint the nonscientific world with his ideas. Wry, dry and sound, they owe their appeal in part to their being genuine reflections, the thoughts of someone who has worked long and hard at tasks worth doing, thinking all the while about what they mean.

Thomas, however, is no old man. His curiosity is overt, his conversation agile, his sense of humor immediate. Most of the time he resembles a professor less than he does a student—a bright student, animated by a sense of discovery, his hand raised, about to enlighten or frighten his teacher.

And unlike those veteran scientists who are inclined to call attention to the fruits of their work, Thomas in his writings, as in the conversation that follows, stresses how little we humans yet know about the world. The dimensions of human knowledge, he reminds us, are dwarfed by the dimensions of human ignorance.

Nature, says Thomas, is amiable, witty.

FERRIS: I would like to begin with a question that the astronomer Allan Sandage once put to me: "What is it about human beings that makes us want to do things that we couldn't do to start with?" Have you thought about the origins of human aspiration?

THOMAS: A little. I'm struck by how compulsively *social* a species we are. I think we have a more biologically set inclination to live as a social species than any of the more famously social animals on the planet, like the termites, the bees and the ants.

Of all the rewards that you could expect to get in a highly social living species, I should think the one that would drive anyone would be the impulse to be *useful.* And probably this is what people are after. The urge to be useful is probably more important to us than survival, or feeding, or propagating, or anything else. I think that most of our trouble in trying to live together comes from our misinterpreting what that word "useful" means.

FERRIS: Isn't there an almost heretical cast to this idea that Man is primarily a social animal?

THOMAS: Not really. Some people object to my point of view. They may take it to imply a kind of benignity. That's more than I mean to imply. But nature is a lot more amiable than we give it credit for being. There is a lot more combination and compromise and friendliness, and quite a few witty things, going on around us.

FERRIS: What do you mean by wit in nature? Does an example come to mind?

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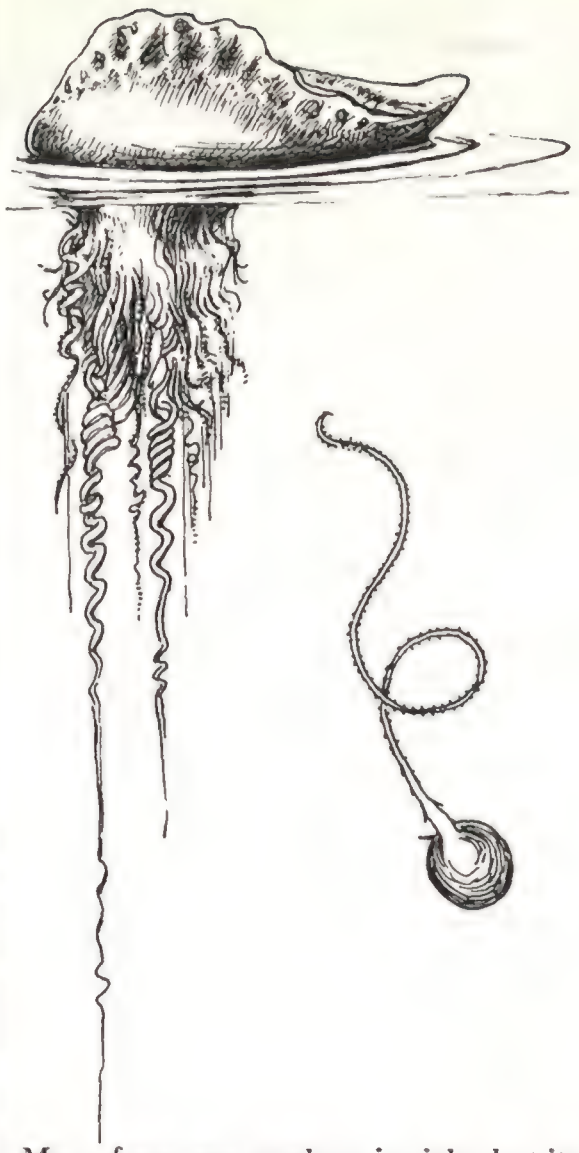

Man-of-war was nowhere in sight, but its nematocyst (right detail) stung surfers.

THOMAS: Well, I can think of two examples. One is a story that I told in my first book, about Australians who were bathing in the surf. Some of them felt that they were being stung by jellyfish, but they couldn't find the jellyfish anywhere in the water. They got a marine biologist to look into it, and he found that the waters were filled with small nudibranch mollusks [family Glaucidae], that had in fact fed on Portuguese man-of-war. They had eaten all the necessary food to be got from their meal, but had preserved the nematocysts, the stinging cells of the tentacles, and provided some mechanism for these to migrate through the body wall and emerge at the surface, so that each of these tiny creatures (right) was equipped with the essential armor of the Portuguese man-of-war. This is apparently something that happens all the time. Nobody wants to waste anything as important as a nematocyst.

Timothy Ferris, author of The Red Limit *(1977), teaches at Brooklyn College.*

The other example comes from a former student of mine who went to Houston recently. He sent me this beetle, which is now dead [Thomas produces a golden beetle in a box]. That's a "mimosa girdler" [*Oncideres pustulata*]. She girdles. She was interrupted part way through the work. The reason I like her so much is she's a good example of planning ahead, of real forethought in a creature that obviously can't have much of a central nervous system. She is attracted, first off, to mimosa trees. Doesn't live on any other tree. She climbs up the mimosa trunk (p. 130), goes out on a limb, and cuts a longitudinal slit with her mandible, then lays eggs in the slit, which almost immediately heals over so that it can't be seen. She then goes back onto the limb and spends a couple of hours digging a girdle around the limb. It's a job of cabinetwork, like a beaver's. Having done that, she's finished. The girdle is just deep enough to kill the limb. It cuts the circulation off.

She departs. The limb dies. The next wind could break it off. And after it falls, the larvae now can hatch, because they're in deadwood. And the cycle begins again.

Now, how did evolution achieve these two separate and—when you think about it, or when she thinks about it—quite unrelated acts of behavior? It looks as though it's really been thought out. She wants to lay her eggs in the mimosa because it is somehow attractive. They can't live in live wood, and the nicest way to kill the wood is to girdle it.

Surfers were stung by small nudibranchs that had fed on Portuguese man-of-war.

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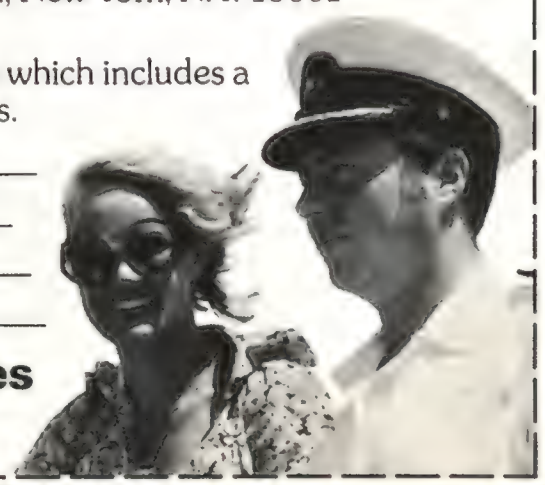


"Mimosa girdler" does cabinetwork on branch in which she has deposited eggs.

Another thing about it that I find attractive is that the mimosa tree (p. 131), at least in the Houston area [*Albizzia julibrissin*], usually has a life-span of only about 20 or 25 years if left to itself, but if pruned regularly, it can probably go on for twice that time. It's very responsive to active pruning. So this is a symbiotic arrangement, profitable to both participants. It's obvious that the mimosa must be producing some secretion that attracts this particular beetle onto it, and perhaps it does so, has been selected to do so, because of the profit that it carries for the tree itself.

FERRIS: Montaigne has a cheerful essay about dying which includes the wonderful phrase, if I recall it correctly, "We must be always booted and ready to go, so far as it is in our power. . . ." Do we worry about dying too much?

THOMAS: Much more, I think, than we ever have before. Dying is viewed as a kind of a violation and an injustice, an avoidable accident, an outrage. That view is new to our culture and new in this century. The old graveyards in New England (p. 134) are full of the graves of children. This doesn't happen anymore. It's a rarity now for young people to die. We're no longer used to the process.

I don't think that in earlier cultures people had anything like that fear of the process because they saw it all the time,

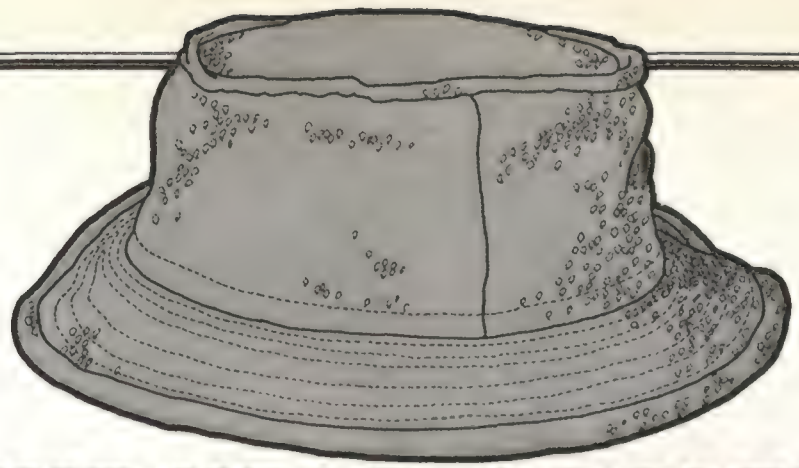
Girdled mimosa limbs die, break off, providing deadwood in which eggs hatch.

and recognized that almost always it's extraordinarily tranquil.

FERRIS: You've expressed skepticism about many widespread beliefs concerned with public health, particularly the notion that jogging can prolong the lives of joggers. You describe jogging as "a stolid sort of rapid trudge."

THOMAS: Some of the joggers look so worried. You drive past them—or walk past them—and they look as though they're staring into hell.

I'm all for jogging in one sense; obviously there is such a thing as being in good physical condition. And you feel better when you are in good physical condition. What I don't like is the notion that there's a real medical aspect to it—that if you jog regularly you won't get a coronary. It's more like a ritual or a duty. There isn't any conclusive evidence, as far as I know, that jogging or any other kinds of exercise prevent heart disease or stroke or any of the other things that worry people. And there's a lot of evidence that improper training for jogging carries with it some hazard of a variety of brand-new orthopedic difficulties that are complicating people's lives—things going wrong with their knees and their feet and legs in general. The idea of a whole lot of people out on the road running around with nothing but preventive medicine on their minds takes all the fun out of it.



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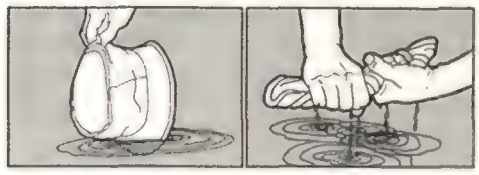

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FERRIS: You've written of individual humans as being a kind of internal community, composed of multitudes of organisms. In *The Medusa and the Snail,* you discuss evidence that warts can be made to disappear by the mind's *willing* them away. You write: "There ought to be a better word than 'Unconscious' [for the part of the brain that has this capacity]. Any mental apparatus that can reject a wart is something else again. This is not the sort of confused, disordered process you'd expect at the hands of the kind of Unconscious you read about in books, out at the edge of things making up dreams or getting mixed up on words or having hysterics. Whatever, or whoever, is responsible for this has the accuracy and precision of a surgeon. There also has to be a Person in charge, running matters of meticulous detail beyond anyone's comprehension, a skilled engineer and manager, a chief executive officer, the head of the whole place. I never thought before that I possessed such a tenant. Or perhaps more accurately, such a landlord, since I would be, if this is in fact the situation, nothing more than a lodger."

Do you in fact feel like a lodger in your own body?

A folk remedy for warts

THOMAS: Sometimes. When I got into that essay on warts I was swept off my feet by the notion that warts could be directed to vanish. I'm still anxious to find out whether that's true or not. It hasn't yet been nailed down so far as I can tell. But, that one essay has elicited more letters than anything else I've written. I receive several letters about it a day.

FERRIS: What do they say?

THOMAS: Many of them, oddly enough, come from people 85 or 90 years old who want to tell me, at some length, in really fascinating letters, about their warts or their neighbors' warts, when they were children. In most of these stories, there is an old man or an old woman down the block in the village where these people lived, who could make warts go away. Each has a story about a family member, or themselves, plagued by warts that wouldn't go away and treated unsuccessfully by their local doctor. And then the old man or woman in the village gave them the directions that succeeded.

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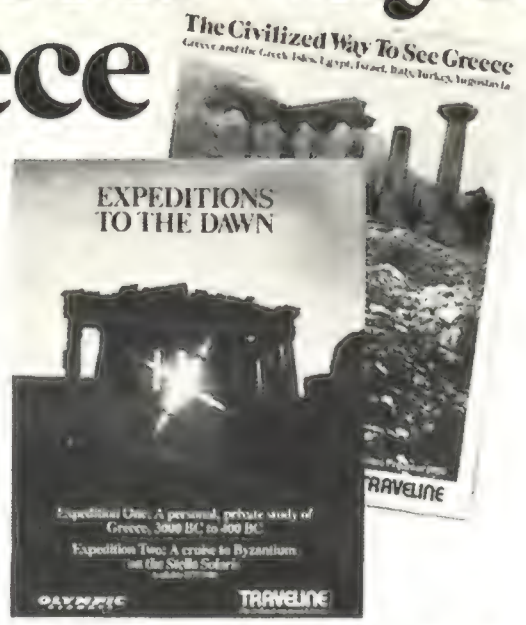

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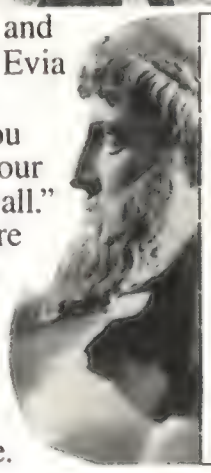

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In old New England cemetery, children's graves are common; people died earlier.

And the directions contain some similarities. One is that you get a certain kind of bean and cut it across the middle, and then you get a piece of string and you tie the number of knots in the string that there are warts (p. 136). You have to count all the warts. In some stories you just leave it alone—put the string folded into the cut surface of the bean, take it out in the backyard and bury it. A variation is to employ a potato or melon, or some other kind of vegetation. But you always have to bury it with the string. Some directions stipulate that you have to bury it in a place where the sun never shines. And then, within four days or six days or a week, the warts all vanish.

FERRIS: I wonder whether we're hearing here the vocabulary of a language that makes sense to the landlord who is in charge of warts?

THOMAS: Yes. There's no reason why this should be an impossible thing for one's unconscious to do, I suppose. There are, after all, enough well-documented experiments that the psychologists and neuropsychiatrists have done, experiments like those that Dr. Harold G. Wolff did some years back at Cornell University Medical School showing that, under hypnotic sug-

gestion, if you exposed a volunteer subject's forearm to mild radiant heat and told him it was very hot and would burn him, subsequently that area would become bright red and blister.

If one's unconscious can go about the complexities of arranging the release of mediators from the appropriate cells in a localized area of tissue so that a blister forms, it seems to me that beyond that there are probably no holds barred. Because that's a very complicated event to bring about. You can't explain it easily by saying, "Well, they thought it was hot and got a blister." To get such a blister, you've got to go through a chain of events that involves alterations in the local vascular bed, may involve getting some leukocytes out to cross the capillary wall or the venular wall and to release histamine-like or other vasoactive substances in the appropriate amounts. It's a very complicated maneuver.

If you can do that, or if you can get your central nervous system to do that on instructions, it's not much less complicated than the business of getting rid of the wart. The thing I'd most like to know about the wart business is whether it is possible, as has been suggested in some studies, to really call the shots so that you can make one wart go away and have another wart nearby preserved. In one study, subjects who had numerous warts on both sides of the body were instructed under hypnosis to get rid of the warts on one side only, and that did work in some cases. In one subject, the unconscious made a mistake and got rid of the warts on the wrong side.

Piping Bach into space

FERRIS: Music shows up repeatedly in your work as a concern—a fascination, really—especially the music of Bach. In an essay on the prospects for communication with intelligent beings beyond Earth, you wrote that music might be the best language "for explaining what we are like to others in space, with least ambiguity." You went on to write, "I would vote for Bach, all of Bach, streamed out into space, over and over again. We would be bragging, of course, but it is surely excusable for us to put the best possible face on at the beginning of such an acquaintance." This remark came up several times during the deliberations of the group that decided which music to

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include on the Voyager phonograph record—the recording placed aboard the Voyager interstellar spacecraft as an artifact of human civilization.

THOMAS: I never knew that.

FERRIS: Three Bach compositions were in fact included on the record, as were many natural sounds of Earth. What is it about music that makes us feel that it is somehow more nearly universal than other languages?

Sliced bean and knotted string is folk remedy widely used to drive warts away.

THOMAS: Well, I can't get this clear in my own mind at all, but I think it's because it's a kind of complicated metaphor for thinking. It's the sound the mind makes. It's not language in that sense. Language is the mind actually working. Music, I think, provides us with instructions on how the two hemispheres of the brain work and how signals are exchanged between them—hundreds of millions of columns of cells that make up the cortex, upon which the phenomenon of consciousness depends. I think we hear that when we listen to music.

FERRIS: You combine an enthusiasm for science—and what you call "the essential wildness of science as a process"—with a deep sense of limits of the degree to which it has yet beaten back our ignorance. Just three years ago you wrote: "These ought to be the best of times for the human mind, but it is not so. All sorts of things seem to be turning out wrong. . . . I cannot begin to guess at all the causes of our cultural sadness, not even the most important ones, but I can think of one thing that is wrong with us and eats away at us: we do not know enough about ourselves. We are ignorant about how we work, about where we fit in, and most of all about the enormous, imponderable system of life in which we are embedded as working parts. We do not really under-

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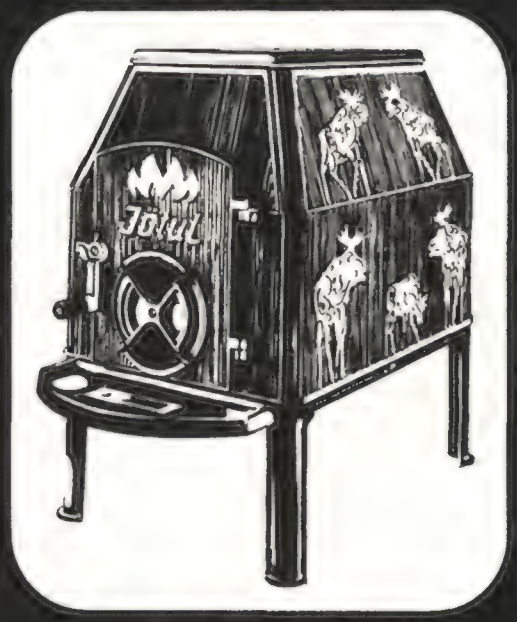

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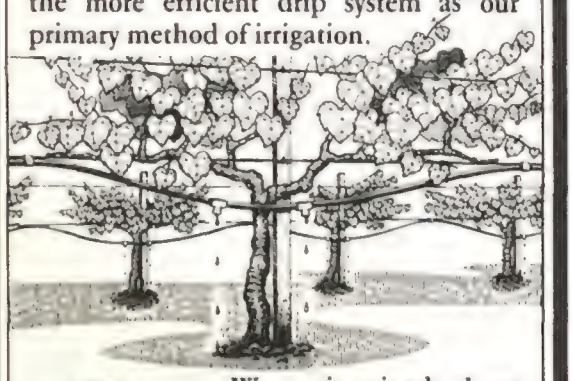

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stand nature, at all. . . . Only two centuries ago we could explain everything about everything, out of pure reason, and now most of that elaborate and harmonious structure has come apart before our eyes. We are *dumb*."

The editor of *Daedalus,* in publishing the essay that contained this passage, described it as "intentionally provocative."

THOMAS: I was trying to make the point that we are only at the beginning of science. We've been at it for, at the most, 300 years, and we've only really been at it full tilt during the past century. In the biological sciences, we are so early on that we haven't yet reached anything like the point that quantum mechanics has reached in this century.

Thomas urges study of Australian termite and protozoan (top) living in its gut.

Discovering our ignorance

We lack the information even to glimpse the basis of consciousness. We don't know anything at all in biologic terms about language. We are beginning to get information about embryologic development, but in general it's safe to say that embryology remains almost totally mystifying. But we are on the way. Given a few more centuries, if we keep at it, we're really going to learn an awful lot about ourselves and about nature in general, and how it works, and how the life of the planet has evolved. We are ignorant, and we're discovering our ignorance. I think that is one of the reasons that we are more nervous than were other cultures before our time.

I guess it's probably true that the phenomena that biologists are obliged to study and try to understand are more complicated by far than the things the physicists study. But even so, it seems to me, from what little I understand of what's going on in modern physics, both on the microscopic and macroscopic levels, that there is much more puzzlement about the laws of nature than there was a century ago. Lord Kelvin, a leading figure in physics at the turn of the century, said that physics was now finished and that if he were a young man he wouldn't go into physics because there was nothing more to be done except tidy up a few things. Then along came quantum theory and relativity and quantum mechanics and all the rest.

I suspect that there will be no end to this process, being the insatiably curious species that we are, exploring, looking around and trying to understand things. We're not ever going to get it solved. I can't imagine any terminal point where everyone will breathe a sigh and will say, "Now we understand the whole thing." It's going to remain beyond us.

FERRIS: Ought science to be viewed more in terms of its questions and less in terms of its answers?

THOMAS: Yes. This is very important, and I don't think that the scientific community is very successful at doing this. Science does two things. I think they have to be looked at separately.

One is that things do turn up from science that become technologies. We wouldn't have the kind of civilization we have today, for better or worse—we wouldn't be alive in such numbers, in such densely packed urban societies—were it not for the science of the preceding two centuries. There's no question about that. So this technological aspect of science is useful.

But the other aspect of science is much more important. And that is that we do get some understanding of where we are, of what the place is like. We're studying nature at a much closer hand than we could ever study before. And instead of getting clearer and easier to understand, it's harder to understand.

FERRIS: You put forth an "earnest proposal" in the first book that we forestall wrecking our civilization "until we have acquired a really complete set of informa-

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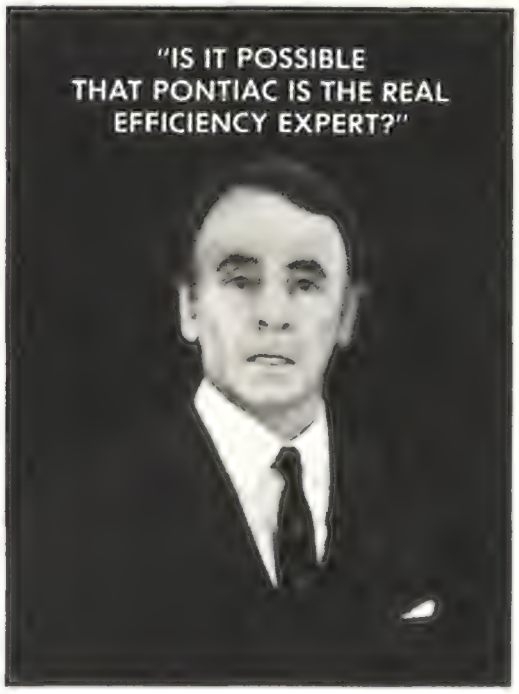

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tion concerning at least one living thing." And you propose that the living thing we study be a protozoan [*Myxotricha paradoxa*], which inhabits the inner reaches of the digestive tract of an Australian termite [*Mastotermes darwiniensis*]. Has any progress been made with this proposal on the scientific front?

What termites can teach us

THOMAS: Termites (p. 138) carrying the same kind of protozoan are now available to biologists in this country. A fair amount of active work is going on, and a lot more attention is now being paid to the possibility that assemblages of independent creatures—spirochetes in this instance—can, in the course of evolution, become functioning, working parts of other organisms. It is a phenomenon that is real and it may be instructing us as to how nucleated cells of all kinds were put together in the first place. The mitochondria and chloroplasts inside animal and plant cells began life as separate, independent bacteria long ago, and were somehow incorporated as working parts into higher cells at the time when nucleated cells first emerged in evolution. They are, in real life, symbiotic partners with all the rest of us.

FERRIS: You've been critical of medical crash programs aimed at specific goals—such as curing cancer—when they are undertaken at the expense of research and development that go deeper but may have less immediate practical application. As with Zen archery, which you discuss in another context, the best way to achieve an end, like curing cancer, may not be to try specifically to cure cancer. Sir Fred Hoyle argues that physics ceased to make rapid progress as soon as the subject became important enough to acquire accelerators and big laboratories. Is this happening in medicine?

THOMAS: We are in trouble because of the size of the system and the amount of money that now goes into it. Most of that money comes from governmental sources, most of it federal. And this means a bureaucracy has to exist to run the system, and the bureaucracy, because of the nature of bureaucracies, simply has to be careful and cautious and conservative. The result over the last eight or ten years has been an increasing tendency on the part of young people to become involved

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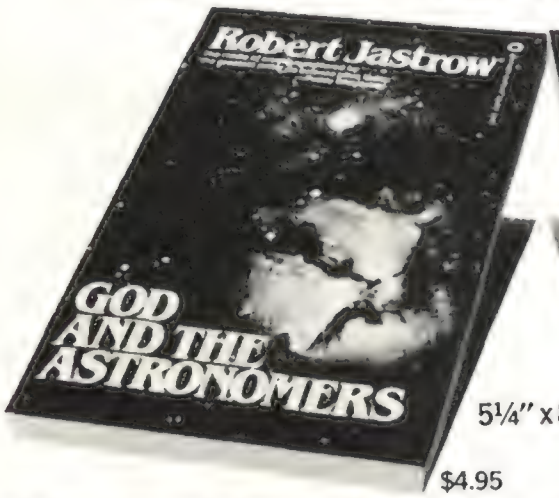

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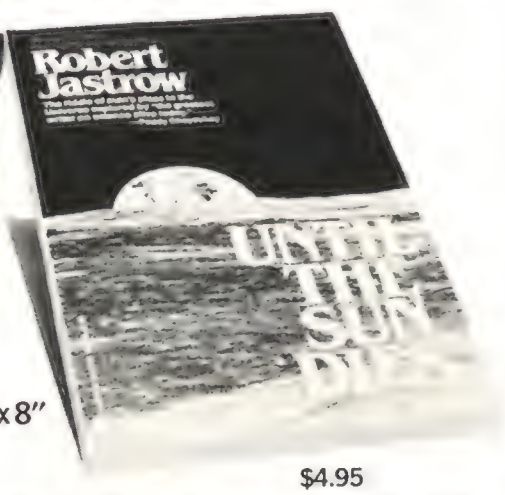

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in research projects that are safe and sound. No one would dare put a graduate student or postdoctoral student onto a very difficult problem involving the kind of chance-taking and gambling that always in the past has been the only way to really find out something new in science. This is dangerous.

We will kill science if we go much longer doing only things that everyone agrees in a committee beforehand are going to turn out as predicted. If all the science that we do does turn out as predicted, if all the experiments come out the way a hundred pages of grant applications say they're going to come out, we might as well not be doing science at all.

FERRIS: In *The Medusa and the Snail* you urge upon us a more active sense of wonderment. Talking about embryology, about the brain coming into existence from what was at one point a single embryonic cell, you write, "People ought to be walking around all day, all through their waking hours, calling to each other in endless wonderment, talking of nothing except that cell."

THOMAS: I feel somewhat the same way about that beetle in that plastic box. It will be a long time, and it will take a great deal of work, before we can say that we really understand that animal and that succession of maneuvers. No matter how productive science is, we're in for a very, very long haul. And we do make a mistake in trying to make it seem as though we've got it all cleared up.

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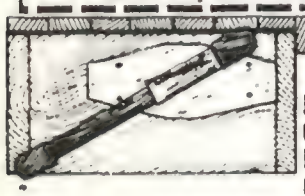

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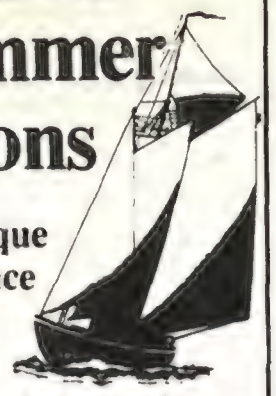

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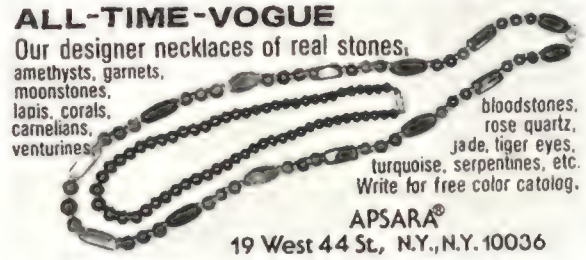
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Book reviews

Photography and the Old West
Karen Current, with photographs selected and printed by William R. Current (Harry N. Abrams in association with the Amon Carter Museum of Western Art, $19.95)

The photographers who went West after the Civil War, in coaches, wagons, converted ambulances, on horseback or muleback, sometimes afoot, were among the most enterprising of frontier businessmen. They signed on with geological surveys to make the first pictures of natural wonders, scaling the peaks of Yosemite or descending into the Grand Canyon, and selling the prints back East. They toured cattle ranches to make portraits of the cowboys, who would pay up to a dollar to decorate their bare bunkhouse walls with images of themselves. They accompanied military expeditions to photograph surrendering savages, as such images excited even more awe in Eastern salons than wilderness views.

Exposing their collodion-coated glass plates and crawling into some dark place to develop the negatives on the spot, these early itinerant photographers produced salable images out of light and shadow, thereby exemplifying the Western virtue of making a profit out of thin air. But in their rush to exploit the wilderness, the photographers managed to preserve it on their glass plates, which in many cases proved less fragile than the landscape. In *Photography and the Old West,* we have a wealth of images made by 19 of these photographers, along with brief biographies and some fascinating notes on the early photographic process.

When Carleton Watkins wandered into

Geronimo, far right, unable to repel the invaders, surrendered in 1886.

the Yosemite range in the 1860s, he had to take a team of five mules to carry his photographic equipment, which included a huge 18-by-22-inch camera with a new 75-degree wide-field Globe Lens for his "grand views." William Henry Jackson also relied on mules when he explored Yellowstone, naming one of them "Hypo."

In order to make a picture, a photographer had to pour collodion over the glass plate, allowing it to form a skinlike gel in which light-sensitive silver salts were suspended. The coated plate had to be placed into the camera and exposed while still wet, then quickly removed to a dark tent, developed and bathed with water. The process was chancy, from coating a glass plate on a windy precipice to finding clean water. Jackson sometimes bathed plates in melted snow.

The results of these photographic forays into the wilderness were of inestimable value. Watkins' pictures are credited with helping convince Congress and President Lincoln to make the Yosemite the first federally protected wilderness area, in 1864. Jackson's photographs, published in a volume entitled *Yellowstone's Scenic Wonders,* were instrumental in the campaign that made Yellowstone the first national park in America, in 1872.

Photographs by John Hillers in the Oklahoma Territory, made for the Smithsonian Institution and the Bureau of Indian Affairs in 1875, were displayed at the Centennial Exposition in Philadelphia, and helped increase public consciousness of Native American cultures. When Major John Wesley Powell established the Smithsonian's Bureau of Ethnology, Hillers was appointed as its first official photographer. In that capacity he spent years recording the demise of many of those cultures.

Some of the photographs in this volume

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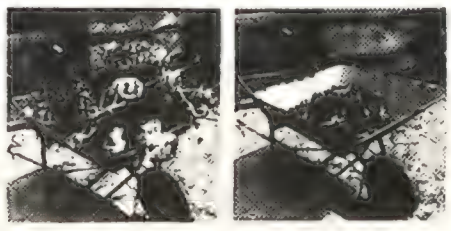

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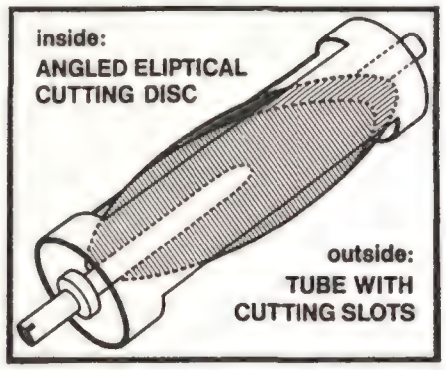

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required considerable daring to make. O'Sullivan took the first underground picture inside a mine, setting off a magnesium flash in the gaseous atmosphere, risking disaster. Camillus Fly, leaving his studio in Tombstone, Arizona, rode with General George Crook to accept the Apache Geronimo's surrender in 1886. Contemporary reports mentioned Fly as "a nervy photographer" who "coolly asked 'Geronimo' and the warriors with him to change positions and turn their heads or faces, to improve the negative."

Other photographs were more mundane in the making, but of no less value in retrospect. In Custer County, Nebraska, a sodbuster named Solomon Butcher discovered that he liked photography more than farming. "Whenever anyone wanted a tintype I dropped my hoe and made it and went back to the field again." Butcher eventually compiled an immense collection of plates and published 200 in his *Pioneer History of Custer County*.

The photographs in this book have a serene, often stilted aspect resulting from long exposures. There is an arresting tension between the vitality of the subjects and their stiff poses, which allows one's mind to enter into the scene. This is a book which can be opened many times, and in which a reader can find far more than meets the eye.

—*Paul Trachtman*
Board of Editors, author of
The Gunfighters

Sodbusters in Nebraska, 1888, symbolize the invading culture.

The Canadians
George Woodcock
(Harvard University Press, $20)

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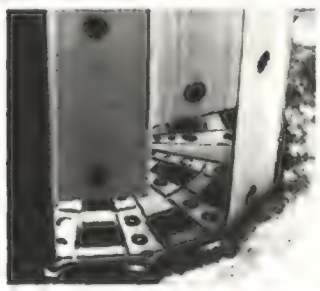

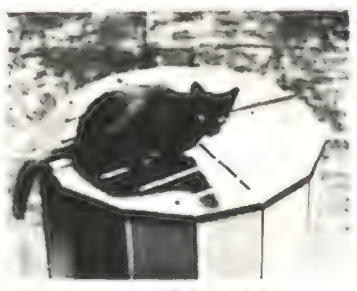

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some time. It is possible, however, to excuse them when you consider that when Canada was created as a nation 113 years ago by Britain's House of Commons, the House was three-quarters empty for the vote (it filled up immediately afterward to debate something more stirring—a dog tax). To British politicians in 1867 Canada was a vague and formless concept. To many Canadians, it remains vague and formless even today. For many Americans, it is more confusing still.

"We have too much geography," as one prime minister of Canada remarked some time ago. Indeed, so sprawling and sparsely peopled is the geography of America's northern neighbor that Canada isn't really a nation at all.

This is the theme of *The Canadians* by George Woodcock, a provocative anarchist who is one of Canada's most respected writers and thinkers. Canadians, Mr. Woodcock notes, "have never decided what they are or who they are. . . ."

But Mr. Woodcock knows what they are. In this thoughtful but ploddingly written book, he provides a collective biography of the Canadian people, along with a look at their arts and literature.

On the surface, Canadians and Americans are much the same. Despite a reputation as sturdy outdoorsmen, most Canadians are urbanites, more familiar with Big Macs than with snowshoes, and Vancouver has more in common with San Francisco than with Halifax. Yet it was friction with the United States, Woodcock points out, that formed Canada.

First, the American Revolution helped populate Canada by prompting more than 50,000 antirevolutionary Loyalists to move north and join the fur trappers and settlers across the border. Later, the border battles with the United States in 1812 "convinced Canadians they had a land worth defending. . . ." And then "the threatening presence of an expansionist United States" after the U.S. Civil War led the bickering colonists of Canada to unite in their own country.

That unity is still incomplete. The brine-toughened, British-Irish islanders of Newfoundland are a different breed from the residents of Americanized Ontario. The Maritime Provinces, built by Yorkshiremen and Scots, French Acadians and American Loyalists, "share many traditions and many resentments that distinguish them from the rest of Canada." The western prairies were settled by peas-

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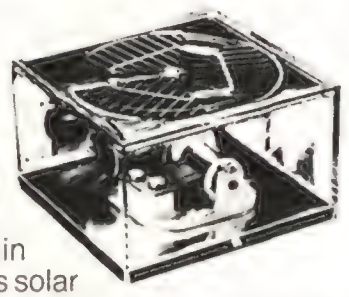

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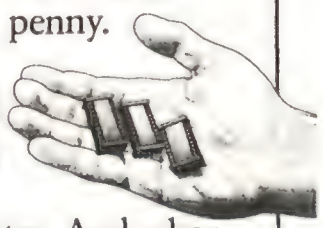

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ants in sheepskin coats from the downtrodden parts of Europe, and there are prairie poets today writing in Hungarian or German. British Columbians on the west coast feel so set apart that in a fairly recent poll they voted Prime Minister Pierre Elliott Trudeau as more detestable than Idi Amin.

The one well-known division is, of course, the movement for independence by French Canadians in Quebec. It could shatter the country. Paradoxically, Mr. Woodcock regards Quebec's René Lévesque as perhaps the greatest friend of a workable unity, "since he has awakened us to the perils of an artificial constitutional unity" which would ignore the variety that makes Canada—"a 'mosaic' of many cultures rather than a melting-pot society on the American model."

Canada is "a huddle of regions," divided by distance, interests, origins and traditions. "Any attempt to tidy it up into a centralized nation-state," Woodcock contends, "would bring its immediate disintegration."

—David Lancashire
Feature writer,
The Globe and Mail, Toronto

How to Have a Life-Style
Quentin Crisp
(Methuen, $8.95)

If, as the Reverend Samuel Wesley said, "style is the dress of thought," then Quentin Crisp is a thoroughly stylish man. Mr. Crisp is a septuagenarian, a studio model for artists for many years, author of an autobiography called *The Naked Civil Servant* which was much admired in his native England and which picked up a number of admirers here, and the star of a one-man entertainment called "An Evening with Quentin Crisp," which has given much pleasure to audiences on both sides of the Atlantic. His following is growing, for many good reasons.

How to Have a Life-Style is another work of merit and should add to his admirers. Indeed, there is little about the book that is not full of style, in the best sense. What the best sense should be is what the book is about.

Mr. Crisp writes with great ingenuousness and not a little beguiling whimsy. He tells us what style is *not:* wealth, fashion, beauty or learning; but mostly, he tries to tell us what it is. In this he succeeds only partially.

There are contradictions in Mr. Crisp's effort which, while irrelevant to an enjoyment of the book, are disconcerting. Mr. Crisp writes that "Style is an idiom arising spontaneously from the personality but deliberately maintained. . . . Mr. Oscar Wilde, considered by some the great expert on this subject, said that, in matters of importance, it was not sincerity that mattered but style. To the true stylist they are the same thing." We are then told that "style is never natural; its nature is that it must be acquired."

While most subjects are treated with the utmost pragmatism, there are passages of remarkable naïveté. "With almost no expenditure at all, we can move into a world where all speech will be a kind of literature, every movement a form of dance. All we need to do is . . . to live for living's sake—with style."

The most disturbing element in Mr.

Quentin Crisp entertains.

Crisp's carefully constructed world, however, is impermeability. The message he gives is unrelenting: developing a life-style is a lonely discipline with no room for risks. The biggest risk of all—closeness to another human being—is unacceptable. "You have to polish up your raw identity into a life-style so that you can barter with the outside world for what you want. This polishing process makes your life so formal that by comparison the life of a Trappist monk is an orgy." And, "*Live Alone.* The continued propinquity of another human being cramps the style after a time unless that person is somebody you think you love. Then the burden becomes intolerable at once."

But, since Mr. Crisp pretends to be

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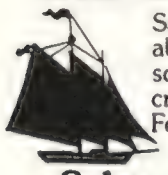

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neither a philosopher nor a logician, it is best to relax and enjoy him. He is a writer with a carefully controlled flair that is personal and distinctive; in other words, a writer with style. When he gets bogged down in after-the-fact reasoning, he suddenly serves another epigrammatic banquet. On contemporary morality he is at his finest. "If they are on the menu at all in modern relationships, faces are for afters." "Morality is expediency in a long white dress."

Mr. Crisp's passages on the living and writing styles of other authors, including Gertrude Stein, Norman Mailer and Oscar Wilde, are dazzling. He cuts to their centers and leaves them delicately eviscerated for all to see.

How to Have a Life-Style is filled with the brittle tension of a hard life's work at surviving. Mr. Crisp's gift is that he is a master leavener. Whatever bitterness or cynicism he may feel is tempered with wisdom, dignity and wit which, as he says, "is the voice of style."

—Jill Merrill
Writer and critic

The Gilgit Game
John Keay
(Archon Books, $17.50)

The Gilgit Game was a series of exploratory and military episodes centered on the western Himalayan town of Gilgit. Now administrative center for Pakistan's Northern Areas, tiny Gilgit is the hub of Asia. A hundred years ago, except for its fragile supply line to Kashmir, it was surrounded by virgin territory. The Gilgit Game, competition to explore and appropriate that vast wilderness, was a part of the Great Game, the 19th-century "rivalry between Russia and British India for control of Central Asia." It was a Cold War between two great empires played out over the boundaries of China, Afghanistan, Persia, the khanates of Central Asia and the western Himalayas.

As novelists have long recognized, the Great Game was the epitome of imperial adventuring: Kipling's *Kim* and *The Man Who Would Be King* and, more recently, George MacDonald Fraser's *Flashman in the Great Game* exploit its whirlwind incidents, exotic settings and enigmatic peoples. But Keay's book bears out his claim that the Gilgit maneuvers stand apart in their wildness.

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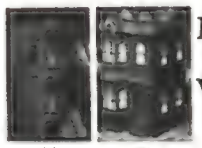

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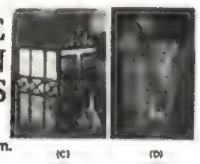

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of the terrain. Let Keay's description of Nanga Parbat serve for any number of stupendous scenes: "The top of the mountain is 26,500 feet above sea level, the bottom of the trough 3,500. At a range of ten to fifteen miles you are seeing in one uninterrupted sweep the greatest slope on the crust of the earth, 23,000 feet of elevation. That's four and a half miles from the bare black rock along the topmost ridges, down through the fields of snow and ice, down the precipices and overhangs, down the long winding glaciers, down through the forest and scrub, and . . . slopes of gravel to the cliffs at the bottom."

Then, as in all accounts of British exploration, there is the fascinating motley of eccentrics. First to arrive was Gottlieb Wilhelm Leitner, a transplanted German who spoke some 20 languages. He wrote interminable books in his self-appointed role as the region's authoritative interpreter. Explorer George Hayward brought with him a fatal inability to perceive danger. Ignoring a host of warnings, he ventured into hostile territory. Toward the end, he realized he was in imminent jeopardy, and he spent his last night keeping watch with a gun in his hand. At daylight he took a nap and was murdered. Sir Francis Younghusband, sent to explore the country behind the Karakorams (and, not incidentally, to gather military intelligence), underwent a mystical transformation in the mountains and later founded the World Congress of Faiths.

Finally, there are the peculiar mores of the native peoples. An 1885 surveying mission did not draw immediate resentment "largely thanks to the doctor's dexterity in the matter of restoring noses; plastic surgery had a great future in a place where the normal punishment for the pettiest of crimes was mutilation." The mission's leader, one Colonel Lockhart, was introduced to a tribal potentate. "Extending a fist like a prizefighter's he grasped the colonel's fingers and, 'according to the very disagreeable custom of the country,' continued to fondle them as they rode side by side."

Keay is not at his best in keeping tabs on the Game's shifting alliances. Yet he is so good at conveying the Game's color and excitement that the book is an excellent guide for anyone wanting to replay Gilgit in his imagination.

—Dennis Drabelle

Washington attorney and critic

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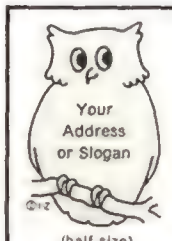

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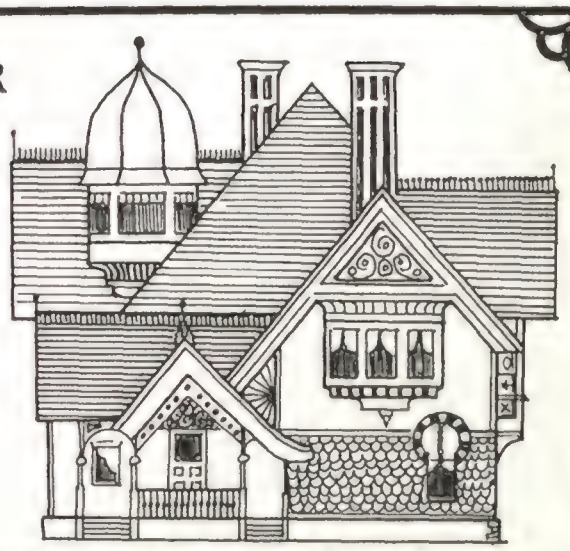

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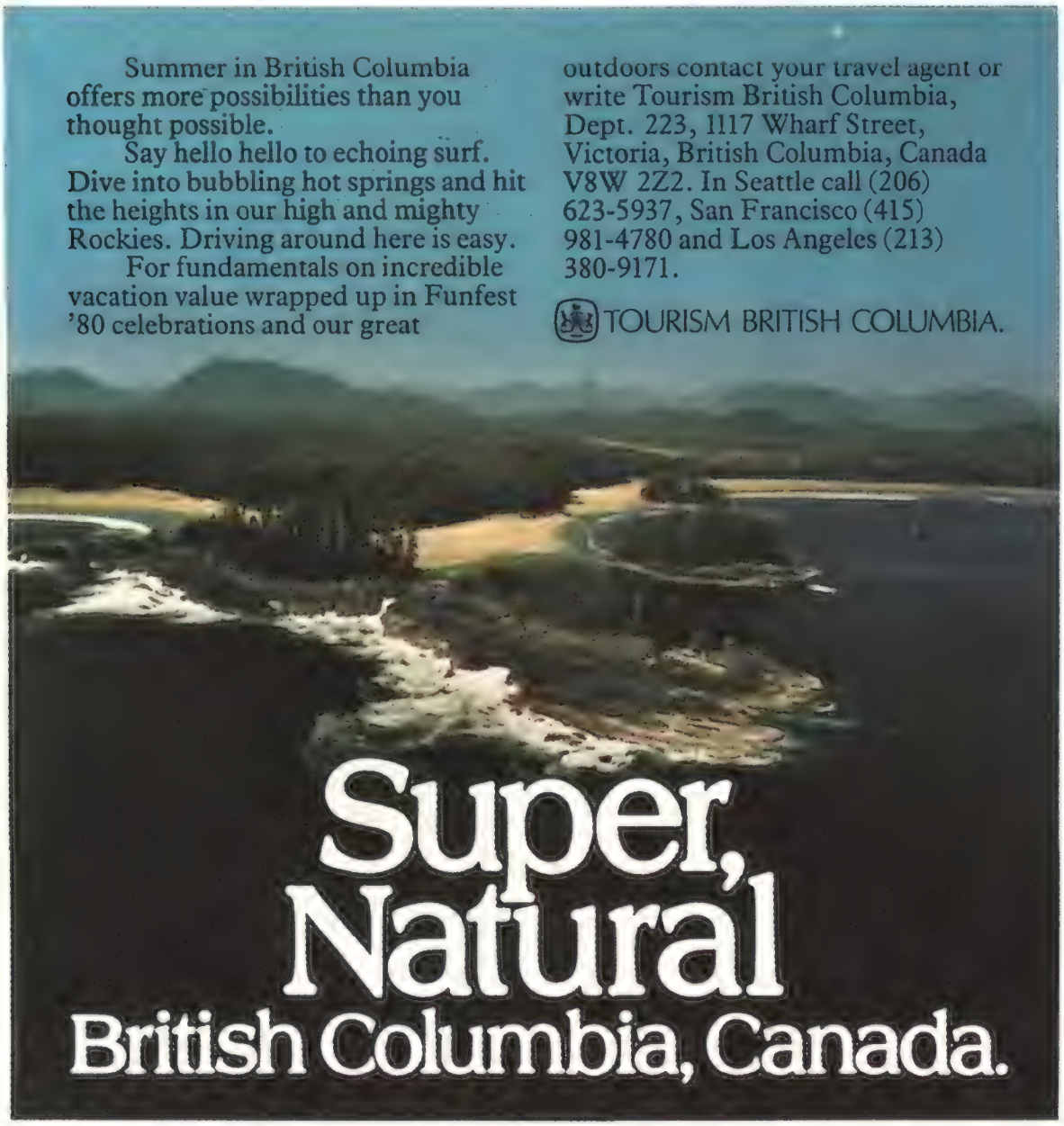

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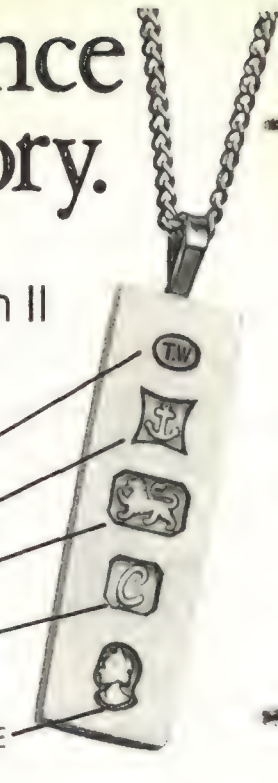

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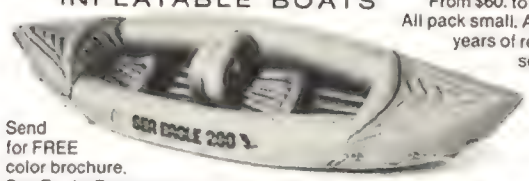

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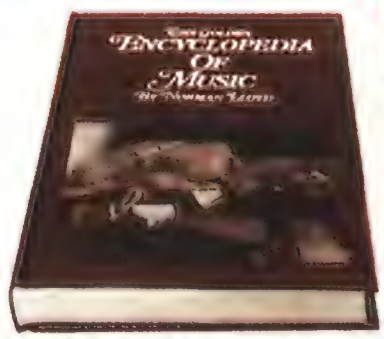

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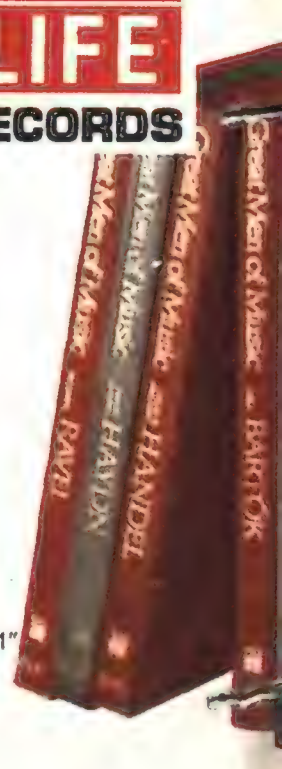

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Smithsonian highlights

Once again the National Collection of Fine Arts opens its galleries (and especially the floors) to children, parents and all those who wish to play with scissors, glue, ribbons, feathers, paintbrushes and other tools of the day.

This year *Children's Day* will feature music, performers, art and do-it-yourself activities of the early 1900s, such as creating silhouettes, nosegays and portraits. The goings-on last from noon to 5 P.M. on April 19, and everything's free.

A hall is being born at the Museum of Natural History (right, top and bottom) —a major complex of exhibits which eventually will tell the story of the emergence of terrestrial plant and animal life. The first hall, which opens this month, illustrates the conquest of land and features murals, dioramas and fossils, from petrified tree stumps to the remains of a giant scorpion.

Summer hours for Smithsonian begin April 1. Museums on the Mall, with the exception of the Freer, will be open 10 A.M.-9 P.M. through Labor Day. The Zoo's hours will be 6 A.M.-8 P.M. For a recording of daily Smithsonian events, call 737-8811.

Special April events

Air and Space Museum
Early Flight—New gallery features aircraft and atmosphere circa 1913.
Stardeath: White Dwarfs and Black Holes (April 16, 7:30 P.M.)—Harry L. Shipman, astronomer at University of Delaware, discusses latest research.
What's Up? (In the Night) (April 5, 9 A.M.)—Monthly sky lecture.

Anacostia Neighborhood Museum
Out of Africa: From West African Kingdoms to Colonization (ends February '81).
Griot from Gambia (April 11; 10, 11 A.M.) —A talk by storyteller Foday Musa Suso.

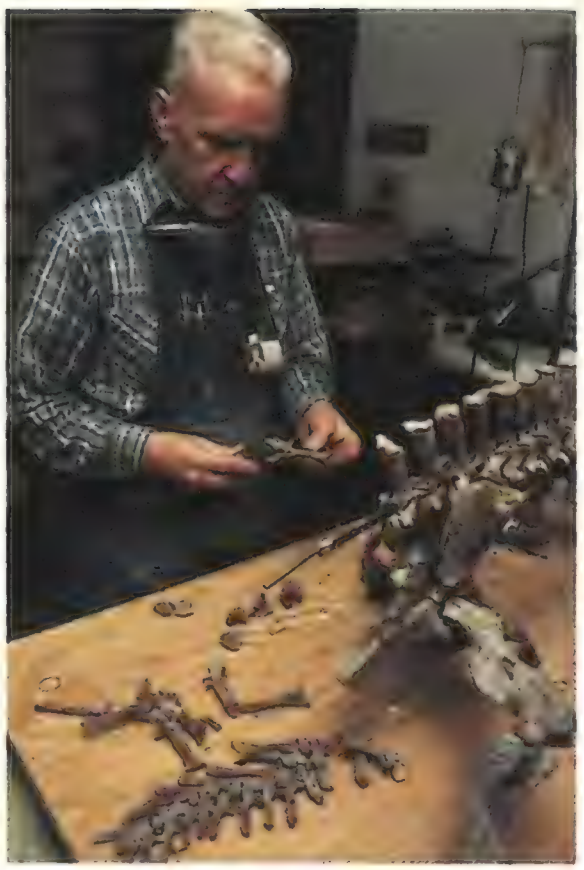
Cooper-Hewitt Museum (New York)
Spectacular Spaces: Drawings from the Cooper-Hewitt Collection (April 5-June 1)—Some unusual architectural drawings by 16th- to 20th-century designers.
Close Observation: Oil Sketches of Frederic Edwin Church (April 29-July 27)—Works of this 19th-century landscapist.

Freer Gallery of Art
Japanese Fan Paintings (through May)—Exhibit of works from Freer collection.
East Asian Paintings and the Scientists: A Materialistic Look at Works of Art (April 8, 8:30 P.M.)—Talk by John Winter, conservator, Freer.
A Decade of Discovery: Selected Acquisitions 1970-1980 (through April 30).

Hirshhorn Museum & Sculpture Garden
Alexander Exter: Marionettes and Theatrical Designs (April 17-July 6)—Works by avant-garde Russian artist (1882-1949).
Stalingrad (Victory in the East) through January 1981—A 16-foot scroll-collage created in 1943-44 by artist-filmmaker Hans Richter (1888-1976).
Miró: Selected Paintings (through June 8) —Major exhibit (p. 102).

Museum of History & Technology (MHT)
The Nation's Attic (April 1-September 15)—Offbeat exhibit (p. 123).
Free Film Theater (Wednesdays, Thursdays, 12:30 P.M.)—April programs focus on Africa.

Museum of Natural History (MNH)
The Conquest of Land (Opens April 17)—New hall illustrates emergence of life.
Japanese Dolls Today (through May 16)—Learning Center exhibit.
Illustrated Lectures—"Making Marine Aquaria Work" (April 4, noon), Walter Adey, curator, Marine Systems Laboratory; "Torngat Project: Recent Smithsonian Archaeology in Northern Labrador" (April 18, noon), William Fitzhugh, curator, North American Archaeology.



MNH specialist works on skeleton.

National Collection of Fine Arts
Walter Quirt (April 4-August 3)—Exhibit includes paintings, drawings, political cartoons from early work of this Midwestern Surrealist.
Children's Day: A Turn in Time (April 19, noon-5 P.M.)—Do-it-yourself crafts.

Artist prepares mural for new *Conquest of Land* hall at MNH.

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National Portrait Gallery
Portraits in Motion: Women of the West (April 26, 1:30, 3 P.M.)—Portrayals by Eugenia Rawls; reservations advised.
Howard Chandler Christy (through August 3)—Illustrations, portraits.

Renwick Gallery
Traditional Marionettes in French Belgium Today (April 23-July 27)—Costumed marionettes, each almost half life-size.
Harmonious Craft: American Musical Instruments, traveling exhibition, Northwest Missouri State University at Maryville, April 7-May 17.

Regional events

Smithsonian horticulturist James Buckler will talk about green things and SMITHSONIAN editor Edwards Park will elaborate on "Around the Mall and beyond" at the next regional events programs in Des Moines and Grand Rapids. The Des Moines program, April 16-22, also includes lectures on monumental sculpture and space settlement; the Grand Rapids program, May 1-6, will feature studios of famous American artists.

Programs in both cities are cosponsored by local cultural and scientific organizations. For further information, write Regional Events, 1208 A&I, Smithsonian Institution, Washington, D.C. 20560.

Smithsonian events

Special events and performances in April are listed below. For tickets, call (A) 202-381-5157 or (B) 202-381-5395, as noted in the listings.
Discover Puppeting! (April 2-27, A&I Discovery Theater, Wednesdays-Sundays)—Award-winning puppet show. (B)
Human Dimensions of the Energy Problem (April 1, 8 P.M., MNH)—Talk by anthropologist Laura Nader. (A)
Torngat: Archaeology at Labrador's Arctic Gateway (April 8, 8 P.M., MNH)—Slide lecture by curator William Fitzhugh. (A)
Joan Miró: A Personal Account (April 9, 8 P.M., HM&SG)—Lecture by art commentator Rosamond Bernier (pp. 102-111) followed by current Miró exhibition. (A)
Exotic Revolution: Orientalism and Early 20th-Century Design (April 12, 10 A.M., 5:30 P.M., MHT)—Seminar. (A)
United House of Prayer (April 13, 3 P.M., MNH)—Gospel music concert. (B)
Keyboards: 1693-1893 (April 14, 8 P.M., MHT's Hall of Musical Instruments)—Harpsichordist Gustav Leonhardt. (B)
Ocean Liners of the North Atlantic (April 15, 7:30 P.M., MHT)—Talk by John Maxtone-Graham. (A)
Henri Cartier-Bresson: 50 Years of Photography (April 24, 8 P.M., MNH)—William Ewing discusses the master. (A)
Solo Jazz Piano (April 27, 6 P.M., MNH)—Paul Bley, Don Pullen, Steve Kuhn present an evening of piano. (B)
Zero Moving Dance Company (April 28, 8 P.M., Marvin Center Theater, George Washington University)—Contemporary dance performance. (B)
Romantic Chamber Ensemble (April 28, 8 P.M., MNH)—Concert. (B)

Radio Smithsonian

This music and conversation program is broadcast weekly on approximately 65 stations across the country. For details, consult your local fine arts radio station. (A different schedule of programs is heard in Washington.)
Popular Culture in the Soviet Union—Discussion by experts (week of April 6).
Singer the Storyteller—Nobel Prizewinner Isaac Bashevis Singer talks about life; *A Century of Ceramics*—A look at the growth of ceramics as an art form in the United States (week of April 13).
As Time Goes By—Once-blacklisted writer Howard Koch, co-author of screenplay for *Casablanca,* talks about his experiences; *Pathways to the Gods*—Astronomer Gerald Hawkins discusses giant drawings of Naca Desert in Peru (week of April 20).
Radio Smithsonian: The First Ten Years—Anniversary highlights (week of April 27).

Enter the world of Cybis...through the pages of *Porcelains that Fire the Imagination...* commemorating four decades of artistic excellence by Cybis, America's oldest existing art porcelain studio. 124 pages dramatically illustrated with over 300 photographs, 158 in magnificent color, survey the history of porcelain art and the Cybis Studio, including a review of sculptures with their dimensions, number in edition, and prices at release and retirement dates. *Send $19.95 to Cybis, 65 Norman Avenue SB, Trenton, New Jersey 08618.*

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Smithsonian Institution Traveling Exhibition Service

SITES circulates exhibitions to hundreds of cities outside Washington, D.C. To sponsor a show in your community, write to Eileen Harakal, SITES, Smithsonian Institution, Washington, D.C. 20560. Here are some April exhibits:

Phoenix (April 12-June 1)—*Korean Village in Transition,* Phoenix Art Museum.
Los Angeles (April 5-May 4)—*New American Monotypes,* UCLA, Frederic S. Wight Gallery.
San Jose, California (April 12-May 11)—*Graficas: Contemporary Latin American Prints,* San Jose Museum of Art.
Fort Myers, Florida (April 12-May 11)—*Visionary Drawings: Architecture and Planning,* Edison Community College Gallery.
Urbana, Illinois (April 12-May 11)—*America's Architectural Heritage,* University of Illinois Dept. of Architecture.
Davenport, Iowa (April 5-May 4)—*Edison and the Electrical Age,* Putnam Museum.
Buffalo (April 12-May 11)—*Audiences of the Moon: Photographs from Lunar Exploration,* Buffalo Museum of Science.
Rochester (April 12-May 11)—*Erté,* University of Rochester.
Dayton, Ohio (April 12-May 11)—*A Gift to the Street: Victorian Architecture,* Lorenzo and Williams Gallery.
Medford, Oregon (April 5-May 4)—*The World of Haitian Painting,* Rogue Gallery Association.
Wausau, Wisconsin (April 25-June 6)—*Ryijy Rugs from Finland: 200 Years of a Textile Art,* Woodson Art Museum.

Membership benefits when visiting the Smithsonian

The **Associates Reception Desk,** in the castle, is open 10 A.M.-4 P.M. daily for registration and information materials. Ask for time and place of "orientation slide-talk" on Smithsonian exhibitions.

The **Associates Lounge** in the castle, a quiet place to relax, is open from 10 A.M. to 5:30 P.M. daily.

The Members' Dining Room, **"The Court,"** in the Museum of Natural History is open extended hours April 1 through Labor Day: Monday-Friday, lunch (11 A.M.-4 P.M.) and dinner (4:30-7:30 P.M.); weekends, breakfast (9-11 A.M.), brunch (11 A.M.-4 P.M.) and dinner (4:30-7:30 P.M.). Enter via Constitution Avenue for breakfast.

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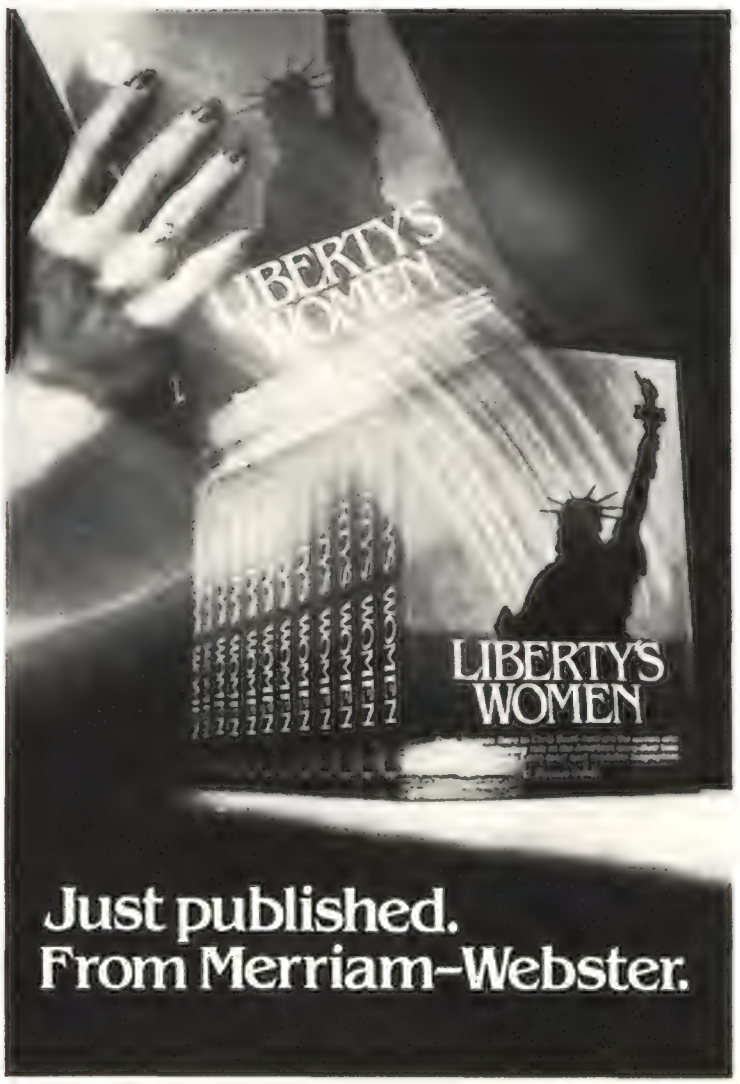

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Belgium Today

A cultural festival honoring Belgium's 150th anniversary of national independence opens in three American cities this month. Funded by the National Endowment for the Humanities and organized by the Belgium-American Education Foundation, the Smithsonian Resident Associate Program and the World Affairs Council of Northern California, *Belgium Today* will open in Washington, D.C., on April 21, in New York City on April 23, and in San Francisco on April 25. Events include art exhibitions, concerts, films, seminars and educational programs.

Some of the more than 75 scheduled activities are listed below. Contact participating organizations for information.

Washington, D.C.
A Salute to Belgium (April 20, 9:30 P.M., The Mall)—Musically choreographed fireworks display.
Seven Belgian Artists: Selections from the HM&SG (right), Hirshhorn Museum, (April 10-May 26).
Leon Spilliaert: Symbol and Expression in 20th-Century Belgian Art, The Phillips Collection (April 19-June 8).
Belgium Today: Technology for Tomorrow, The Mall (April 20-May 25).
Treasures of Belgian Culture and *Founding of the Belgian Nation in 1830,* Library of Congress (opens April 21).
Georges Vantongerloo, Corcoran Gallery of Art (April 23-June 17).
Ensor Prints, Meridian House International (April 27-May 31).
Tapestries of Jan Yoors (below), National Academy of Sciences (April 9-June 1).
Raphael Druian Concert, Library of Congress (May 2, 8 P.M.).
Solvay Conference on Aspects of Chemical Evolution, National Academy of Sciences (April 23-24).
Smithsonian Workshops—Marionette making: young people's course (April 19-May 17); tapestry weaving (Thursdays, April 17-June 5); lace making (April 27).
Recent Films and Rediscoveries—free films, Smithsonian (Tuesdays, 7:30 P.M., May 6-June 17).
Future of Business in Belgium, symposium, Georgetown University (May 5-6).
The Splendor of Belgium, lecture course, Smithsonian (Wednesdays, 8 P.M., April 30-May 28).

New York
Stavelot Triptych and Legend of the True Cross, Pierpont Morgan Library (April 26-July 31).
Belgian Art, 1880-1914, Brooklyn Museum (April 23-June 29).
Kinetics Around a Fountain: Pol Bury, Solomon Guggenheim Museum (May 16-June 7).
Leon Spilliaert: Symbol and Expression in 20th-Century Belgian Art, Metropolitan Museum of Art (July 8-August 31).
Two by Two by Belgium, children's theater, Lincoln Center, April 25 (p. 36).
Recent Films and Rediscoveries, Museum of Modern Art, May 1-May 12.

René Magritte's bronze, *The Therapeutist,* at HM&SG . . .

San Francisco
Pierre Alechinsky: Prints, San Jose Museum of Art (May 14-June 29).
Arts and Crafts of Belgium, St. Mary's College (April 1-May 21).
Belgian-American Relations Through Two World Wars, Stanford University, (April 25-June 25).
Pantagleize, American Conservatory Theatre (March 18-May 31).
Béjart Ballet of the 20th Century, University of California (April 22-27).

. . . and tapestry by JanYoors at National Academy of Sciences

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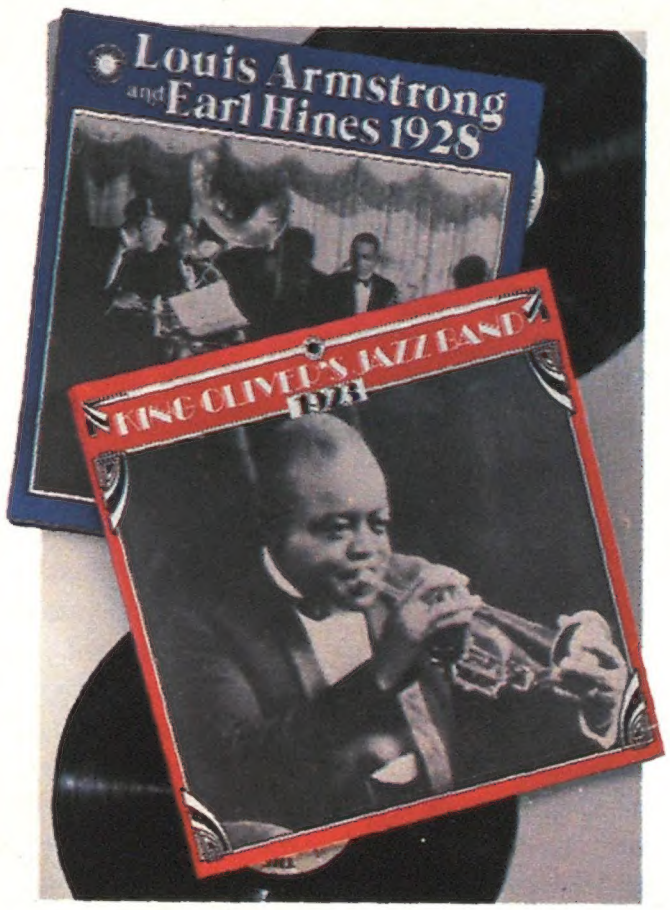

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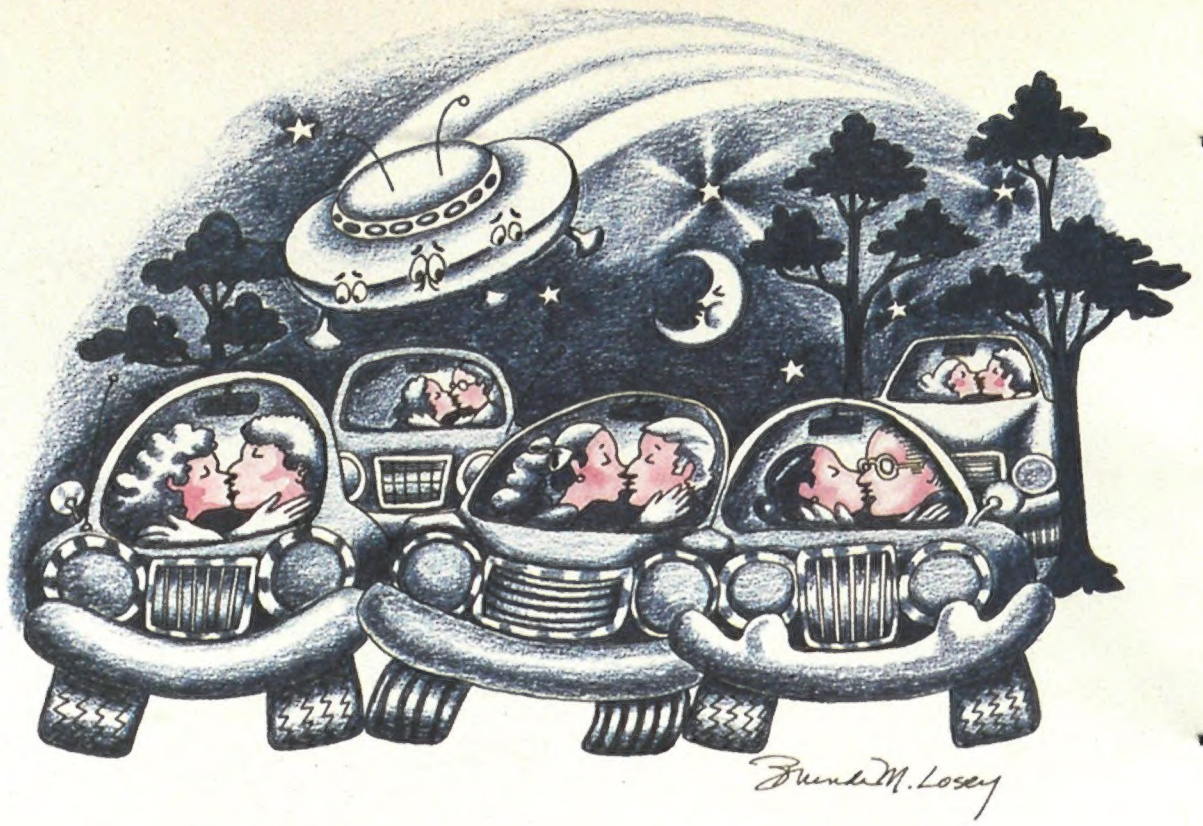

Although the prevailing rulers of China are happily becoming ever more amenable to Western forms of contact, something of a hard line still seems to be drawn against the mouth-to-mouth variety. In Beijing (formerly Peking) the *Workers' Daily* has advised its readers that kissing is unhealthy and should be discouraged between adults as well as adults and children. Since infection can be transmitted lip to lip, the *Workers' Daily* concludes that "Kissing is indeed a harmful form of behavior."

That stricture would find little support along our Occidental lovers' lanes, but it would not be taken amiss by many Orientals. The invasive Europeans brought the kissing custom to the East, but it never really caught on there. Historically, the Chinese have regarded kissing as a vulgar practice which is all too suggestive of cannibalism.

This view was shared by Africans and may account for the comparative unpopularity of the endearment among natives of their continent. Except among those who deliberately adopted Western ways, the Japanese generally consider kissing to be an utterly immodest habit.

Such foreign disapproval has not, however, diminished the popularity of osculation in America. As witnessed by the visiting author George Mikes, who discovered that "One of the most popular American entertainments is kissing. Young men and young girls pull up on the highways and kiss each other between 6:30 and 10:30 P.M."

The world record for long-term kissing has been claimed, if you care, by Bobbi Sherlock and Ray Blazina; in a 1978 smoochathon in Pittsburgh, they joined their lips and kissed on and on for 130 hours, 2 minutes—in aid, they said, of a cystic fibrosis campaign.

Before its adoption for amorous purposes, kissing was a form of social salutation, and as such it goes back in record at least to Biblical times. It was then mainly an expression of reverence, greeting or farewell, and there are mentions in the Bible of situations in which he "fell on his neck and kissed him." But kissing between the sexes was not a general practice, and while the cheeks, forehead or beard might be kissed, the lips were not considered correct for contact.

Something of this tradition appears to be carried on today by French and Russian politicians who, whenever they tread the red carpet of welcome, are disturbingly fond of nuzzling their visiting counterparts on either jowl. Life holds few spectacles of embarrassment to match that displayed on the uneasy features of a British or American statesman, bred in the tradition that real men don't kiss one another, as he is given the smooch on either cheek by some Gallic government grandee or poker-faced pillar of the politburo. If ever friendship breaks out between their two nations again, it can only be hoped that the Russian treaty signers don't spoil everything at the last moment by giving the Chinese delegates the big, both-cheek-smacking hello.

Kissing has some proven medicinal value, as evidenced by toddlers the world over who are convinced that a maternal kiss upon any bumped portion of their anatomy will swiftly make it better. It is a panacea for all infant injuries rivaled only by a placatory handful of chocolate drops. Fairy tales later reveal that a simple kiss is universally recommended as the sovereign remedy for awakening Sleeping Beauties or insensible Snow Whites, provided it is delivered by a young and handsome prince.

In more orthodox medical terms, Dr. Henry Gibbons once defined a kiss as "The anatomical juxtaposition of two orbicularis oris muscles in a state of contraction." Such contact is considered likely to arouse excitement in the participants because, physiologically, the reddish skin of the lips is a transition layer between the outer, hair-bearing tissue of the body and the inner mucous membrane, and is abundantly provided with sensitive nerve endings. That clinical information may readily explain to all enraptured lovers just why the mutual conjunction of their mouths should send that old black magic up and down the spine.

It might even explain the motivation which compelled Al Jolson musically to implore, "Kiss me, Tootsie, and then, do it over again," drove the lady who was wild about Harry to proclaim that "The heavenly blisses of his kisses fill me with ecstasy," and inspired Ray Noble to glorify, at last, "The moment divine, the touch of your lips on mine." At which passionate point, before the steam starts coming out of anybody's ears, it may be as well for all of us to stop and go take a cold shower.

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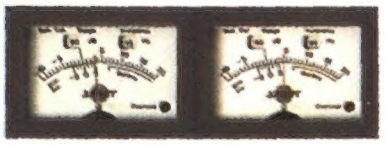

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